5.6.3 Economic Benefit

Economic benefit is evaluated as follows:

(1) Benefit of Flood Control Project

The economic benefit of the flood control project is presented as an effect of reduction in the flood damage to assets, agricultural products and economic activities in the river basins. The average annual flood damage shown in Section 3.1 is given as an average annual benefit of flood control project after completion of the construction work.

The average annual benefit is estimated at Rp. 40,215 million for the Deli-Percut River System as a sum of both benefits of the Deli river flood control project and the Percut river flood control project, and it is estimated at Rp. 8,961 million for the Padang river flood control project. The annual flows of these benefits are given in Table 5-3.

(2) Benefit of Water Supply Project

Economic benefit of the water supply project is generally estimated by multiplying an effective water quantity by an economic price of water. The urgent water supply project formulated in the present study is only construction of the Lausimeme Dam, excluding construction of water supply facilities such as treatment plant, transmission and distribution pipes and other facilities connected to users. Accordingly, the water price and produced quantity at the dam site are adopted as the basic values for estimating the economic benefit.

In the present study, the water price and its rise are respectively assumed to be Rp. 50/m3 in 1993 and the annual rate of 5% during the period of project life, as discussed in Section 4.4.

On the other hand, the quantity of water produced at the Lausimeme dam site is estimated at 3,700 l/s, i.e., 116.68 million m3 per annum. Under the conditions described in Section 4.4, the annual benefit of the water supply project is expected to accrue during the project life as follows:

Annual Benefit of Water Supply Project

Year		Annual	Year		Annual
From	To	Benefit (mil.Rp.)	From	To	Benefit (mil.Rp.)
1993	1997	6,447	2023	2027	27,865
1998	2002	8,229	2028	2032	35,563
2003	2007	10,502	2033	2037	45,389
2008	2012	13,403	2038	2042	57,929
2013	2017	17,107	2043	2047	73,934
2018	2022	21,833	2048	-	94,360

(3) Benefit of the Integrated Project

The economic benefit of the integrated project for the Deli-Percut River System is given as a sum of both benefits of the flood control project and the water supply project, and the average annual benefit is indicated in Table 5-3.

5.6.4 Cost-Benefit Analysis

Results of cost-benefit analysis for the urgent flood control project and the water supply project are given in Table 5-4, and the EIRR is summarized as follows:

Economic Internal Rate of Return

Project	EIRR (%)
1. Deli-Percut River System	
1.1 Integrated	14.35
1.2 Flood Control	17.90
1.3 Water Supply	9.90
2. Padang River Flood Control	11.86

In the results shown above, the flood control project is economically feasible. The EIRR of water supply project is nearly 10%, which is a fairly high rate compared with those of similar domestic water supply projects. This shows that the water supply project is feasible from the socioeconomic point of view.

Sensitivity Test

Various conditions and assumptions have been set in the careful study based on professional experience and appropriate judgment of experts, but there always remains the problem as to the degree of reliability of inputs. Therefore, a test is carried out for sensitivity of the EIRR to variations in the economic cost and benefit estimated.

Sensitivity tests are made on the EIRRs with 5% and 10% increase in the economic cost and with 5% and 10% decrease in the economic benefit. The results are given in Table 5-5.

The results show that the EIRRs of the integrated project and the flood control project are still maintained at more than 10% even if the cost goes up by 10% or the benefit comes down by 10%, which means that the economic feasibility of these projects is justifiable. The water supply project also maintains an EIRR of more than 9% even if the cost or benefit increase to 10% or decreases to 10%, respectively, which means that the project satisfies the condition of socioeconomic feasibility.

5.7 Social and Environmental Assessment

5.7.1 Social Impact

An environmental impact study was carried out in and around the urgent project area from two (2) viewpoints, social impacts and natural impacts. According to the results of the study, project implementation may bring about both beneficial and adverse social and environmental impacts before and during construction, and after completion of the project. On the long run, however, the beneficial effects could outweigh the adverse ones leading to stimulation of socioeconomic activities and unimpeded development of the region as a whole.

Stimulation of Socioeconomic Activities

Investment for and construction of the urgent project will not only increase economic activities but also stimulate the social atmosphere therearound. The urgent project will bring many business opportunities to the project area and give various incentives for advancement. Such stimulation of socioeconomic activities will result in technology development and educational improvement, together with the development of transportation and tourism which will further derive more benefits for the region.

Public Awareness and Participation

Lausimeme Dam and Medan Floodway, which will be constructed near Medan City, the capital of North Sumatra Province, are expected to become significant structures. For efficient operation and maintenance of the structures, public awareness of their important role in flood control and water supply is expected, and this could materialize with proper educational campaigns explaining such matters and obtaining public support and cooperation, including the public's participation in such activities. Through proper management of project implementation, it is also expected that the private sector will come into the development activities related to the project works and the area.

5.7.2 Environmental Impact

The main subjects regarding the construction of a dam are biological aspects. There are 37 species of terrestrial flora, 20 kinds of wild animals and 29 kinds of birds observed in the dam project area. Several of them are specifically protected under government regulations, and none of them are endangered by implementation of the project.

The route of the floodway is almost covered by paddy and bushes, but the main environmental impact of the floodway will arise after construction. In the dry season, the floodway may become a dumping site for solid waste or household garbage if not properly managed.

The main subjects in the environmental impact of river improvement for Deli, Percut and Padang are the aquatic flora and fauna, house evacuation and land acquisition. There are only 11 to 15 kinds of terrestrial flora and 14 types of fishes observed in the Padang, Deli and Percut rivers. No protected species is observed. The required house evacuation is estimated at about 1,500 houses. Results of

impact analyses using the matrix method are summarized as follows:

Environmental Impact Analysis

Project	Basic Evaluation on Environment			Change of Environmental Beauty
	Importance of Resources	Environment Condition	Sensitivity of Management	
Lausimeme Dam	very high scale of 5	good scale of 5	medium scale of 3	-1 (-15%)
Medan Floodway	very high scale of 5	good scale of 4	medium scale of 3	-1 (-12%)
Deli River Improvement	high scale of 5	good scale of 4	medium scale of 3	-1 (-19%)
Percut River Improvement	high scale of 5	good scale of 4	medium scale of 3	-1 (-14%)
Padang River Improvement	high scale of 5	good scale of 4	medium scale of 3	-1 (-17%)

For the above basic evaluation, the following scaling criteria are applied:

Scale Criteria

Kind of Evaluation	Scale	Characteristics
Importance of Resource	1	Not important
	2	Less important
	3	Moderate
	4	Important
	5	Most Important
Environmental Condition	1	Bad
	2	Not too bad
	3	Medium
	4	Good
	5	Very good
Sensitivity of Management	1	Very Difficult
	2	Difficult
	3	Quite Difficult
	4	Easy
	5	Very easy

The results of the environmental impact study was submitted to KOMPUS AMDAL-PU (the Central Commission of Environmental Impact Assessment, Ministry of Public Works) on February 10, 1992, for its perusal. Then, a meeting among representatives of KOMPUS AMDAL-PU, P3SA of DPUP North Sumatra and LATMI-USU, the firm which conducted the environmenal impact study under subcontract with JICA, was held in Jakarta on February 15, 1992. Although some comments were made indicating the necessity of other relevant information, the necessary steps will be undertaken by the Project Proponent, DGWRD, to realize project implementation as soon as possible.

To maximize the positive impact and minimize the negative impact of project works, the environmental management plan (RKL) and the environmental monitoring plan (RPL) shall be arranged when the proposed project is implemented.

5.8 Project Implementation

5.8.1 Implementation Schedule

The urgent plan is divided into two (2) areas, the Deli-Percut River System and the Padang River Basin. The former is tentatively named as Deli-Percut River Flood Control and Water Supply Project and the latter is Padang River Improvement Project.

The financial project cost is estimated at Rp. 493,373 million for the Deli-Percut and Rp. 73,574 million for the Padang, totaling approx. Rp. 567 billion including price escalation (at 1991 prices). Therefore, the annual average fund required for the project implementation is approx. Rp. 95 billion which corresponds to 2.2% of the projected GRDP of Rp. 4,370 billion in the study area in 1991, while the projected budget expenditure of the North Sumatra Provincial Government will amount to about Rp. 450 billion in 1991. Therefore, it is assumed that project implementation is to be financed by international funding institutions.

The invitation for prequalification of construction contractors for the Deli River Improvement Works which has been proposed in the flood control component of MUDP II, was made on November 12, 1991. Channel improvement, lining levee embankment and ancillary works will be undertaken for a total stretch of 25,309 m of the Deli mainstream up to the confluence with Babura River. Construction works started in 1992 and are expected to be completed in 1995.

In view of the implementation of the Deli River Improvement Works mentioned above, implementation of the Deli-Percut River Flood Control and Water Supply Project is divided into two (2) portions. One is the Deli River Improvement Works and the other portion consists of the Percut River Improvement Works, the construction of Medan Floodway and the construction of Lausimeme Dam. The financial project cost for the former is Rp. 226,630 million and the latter is Rp. 266,743 million.

The annual average fund required for the implementation of the Deli- Percut River Flood Control and Water Supply Project excluding the Deli River Improvement Works is estimated at approx. Rp. 38 billion. As for the Padang River Improvement Project, it is estimated at Rp. 12 billion.

In compliance with the construction schedule stated in Subsection 5.5.1, priority of implementation is given to the Deli-Percut River Flood Control and Water Supply Project. On the assumption that the detailed design for the project excluding the Deli River Improvement Works is carried out after this feasibility study, the implementation schedule is prepared based on the priority of project components, with the target year 2000, as shown in Fig. 5-17.

5.8.2 Recommendation to Pursue the Urgent Project

Development of Tourism and Recreation

Lake Toba is well known as a resort among the people in Medan and its vicinity. However, the location is far and only those who can financially afford visit the lake for leisurely activities.

The proposed Lausimeme Dam is only 32 km away from the center of Medan. The surrounding area is gifted with natural vegetation, flora and fauna, and topographically superior scenery. Construction of the dam will create an artificial lake which has many possibilities for recreational activities such as fishery, camping, swimming, boat rowing and other water-related amusements. With its easy accessibility and the abundant natural resources, the Lausimeme Dam could be a promising resort for tourism development.

In this connection, it is recommended that land resources development be studied and implemented simultaneously with the implementation of the urgent project.

Participation of Private Sector

In accordance with the procedure for a large-scale water supply development project in Indonesia, water sources are developed by the central government, i.e., the DGWRD, Ministry of Public Works, as part of multipurpose water resources development. Water for municipal/domestic uses is allocated to the DGCK and to local governments which are responsible for water supply projects at the producer's price.

Then, a kind of state enterprise (PDAM) manages the water supply system after the construction of main structures and the transfer of operation/administration from the BPAM. As a private sector organization, the state enterprise has to gain some profits for cost of operation/maintenance of the system and for cost of future improvement and expansion of services. The storage capacity of the proposed reservoir is allocated mostly for water supply, which is estimated at 29,500,000 m^3 or 90% of the effective storage capacity.

The proposed Lausimeme Dam, as stated in the foregoing, is expected to have secondary benefits by promoting tourism development and increasing opportunities for leisure and recreation of people in Medan and its vicinity. Although Lausimeme Dam will have an important effect on flood control of the Deli-Percut River System, the dam and reservoir as well as the impounded water will contribute much to the area of Medan and its vicinity for the betterment of people's living standard. Therefore, it is recommended that the participation of the private sector is not only on operation/maintenance but also on project implementation.

Further Study

(1) Survey

The optimum floodway route is selected in this study using the topographic map with a scale of 1:5,000. Therefore, detailed river survey or topographical survey is recommended to be conducted in the detailed design stage. Furthermore, detailed topographic survey with a scale of 1:500 is required for the proposed Lausimeme dam site and additional aerophoto mapping with a scale of 1:5,000 is necessary for possible quarry sites around the reservoir.

(2) Geological Investigation

In this present study, a total of 150 m of drilling, in-situ permeability test and some uniaxial compression of drilling core were undertaken for the proposed Lausimeme Dam. Detailed geological investigation of additional drilling for the dam site and saddle portion of the reservoir are necessary for the detailed design. Investigation of core and rock materials and other soil mechanics tests shall be carried out before the detailed design.

(3) Environmental Impact Analysis

During the feasibility study, environmental impact study (ANDAL) was conducted for the urgent project. Although the study shows only small negative impacts to occur during the construction of urgent project as stated in Section 5.7, a more detailed environmental impact assessment has to be conducted by the authorized commission before the detailed design with simultaneous preparation of the environmental management plan and the environmental monitoring plan.

TABLES

Table 2-1 MEAN MONTHLY RAINFALL AT REPRESENTATIVE STATION, 1969-88

(Unit : mm)

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Aug	Nov	Dec	Year
No. 1.01	103.2	108.4	107.8	141.3	188.1	151.3	149.5	182.4	248.6	299.1	251.6	223.5	2,154.4
No. 1.09	80.5	69.1	89.4	110.4	155.6	100.2	124.2	167.2	209.9	241.2	220.6	182.1	1,750.0
No. 1.16	95.2	91.6	96.2	142.8	195.4	134.0	169.9	197.4	259.1	289.9	241.2	190.9	2,103.6
No. 1.19	98.5	56.7	66.2	87.9	136.0	110.7	119.8	153.8	230.8	261.3	217.3	203.7	1,742.4
No. 1.23	85.6	60.8	88.2	129.6	186.0	150.4	153.9	180.5	231.5	272.2	241.8	201.7	1,982.1
No. 3.03	93.1	74.4	99.3	133.3	180.3	133.8	153.6	190.7	260.9	284.2	252.7	201.3	2,057.3
No. 3.06	151.3	141.5	100.1	176.0	242.5	199.4	216.5	250.0	292.9	330.6	275.1	232.4	2,608.3
No. 3.14	118.5	105.8	105.9	160.6	174.5	162.3	168.4	206.7	273.2	291.4	262.6	215.6	2,245.5
No. 3.22	68.9	57.0	84.6	95.3	131.8	106.2	138.7	136.2	184.8	198.5	186.6	172.6	1,561.0
No. 3.32	172.3	167.9	155.9	189.0	314.3	187.9	248.7	248.1	308.2	357.8	289.3	264.3	2,903.6
No. 4.02	123.9	109.4	130.8	214.8	299.1	172.2	225.1	217.4	349.6	361.9	273.4	217.6	2,695.1
No. 4.03	97.0	70.9	79.7	141.1	155.5	122.3	153.1	160.7	207.8	235.1	167.6	149.7	1,740.5
No. 4.05	121.0	121.7	107.0	207.8	227.4	157.8	195.8	185.2	290.1	273.4	250.9	204.8	2,342.9
No. 4.07	121.3	106.9	115.6	201.1	228.8	177.2	203.1	187.9	301.4	297.5	262.8	203.4	2,407.1
No. 4.17	81.6	69.9	91.8	126.8	138.6	107.7	127.9	148.7	213.5	227.7	177.0	150.6	1,661.9

Table 2-2(1/2) ANNUAL MAXIMUM DISCHARGE RECORDS (AUTOMATIC GAUGE)

Station	Asam Kumbang			Simeme			Tembung			Kampung Serdang			Silau Dunia			Tebing		
Area	(209 km2)			(158 km2)			(171 km2)			(671 km2)			(72 km2)			(919 km2)		
River	Belawan			Deli			Percut			Serdang			Belutu			Padang		
H - Q	Q = from Table			Q = from Table			Q=6.87(H+0.42)^2			Q=22.47(H+0.34)^2			Q=6.01(H-0.38)^2			Q= from Table		
Year	Date	H (m)	Q (m3/s)	Date	H (m)	Q (m3/s)	Date	H (m)	Q (m3/s)	Date	H (m)	Q (m3/s)	Date	H (m)	Q (m3/s)	Date	H (m)	Q (m3/s)
1980	X	X	X	30/Oct	2.43	79.1	X	X	X	X	X	X	X	X	X	31/Dec	2.81	170.0
1981	X	X	X	16/Dec	2.42	78.3	X	X	X	X	X	X	X	X	X	6/May	2.84	172.9
1982	16/Sep	3.80	270.0	29/Dec	2.49	79.8	X	X	X	X	X	X	X	X	X	X	X	X
1983	8/Nov	2.46	151.0	30/Sep	2.53	84.9	X	X	X	X	X	X	X	X	X	X	X	X
1984	3/Dec	3.04	211.2	X	X	X	30/Oct	3.06	83.2	9/Feb	2.47	177.4	8/Nov	1.52	7.8	X	X	X
1985	21/May	3.59	260.9	6/Oct	2.90	101.4	21/May	3.49	105.0	19/Dec	2.34	161.4	19/Dec	1.73	11.0	17/Dec	2.47	146.0
1986	7/Dec	4.34	352.1	6/Dec	3.01	103.2	7/Dec	4.67	178.0	7/Dec	2.54	186.4	18/Apr	1.76	11.4	14/Apr	2.46	146.0
1987	7/May	3.05	214.8	16/Sep	2.43	80.8	10/Dec	4.45	162.9	26/Jul	3.24	288.0	10/Dec	2.49	26.8	8/Dec	1.83	108.0
1988	X	X	X	19/Sep	2.48	83.8	1/Apr	2.97	79.0	15/Feb	2.16	140.4	3/Sep	1.96	15.0	30/Sep	2.23	132.0
1989	23/Nov	4.46	359.7	24/Sep	2.12	73.0	19/Dec	4.24	149.2	X	X	X	11/Sep	1.88	13.5	24/Oct	1.83	108.0

X : No data available

Table 2-2(2/2) ANNUAL MAXIMUM DISCHARGE RECORDS (STAFF GAUGE STATION)

Station	Kampung Lalang			Helvetia			Pulau Tagor		
Area	(254 km2)			(341 km2)			(1031 km2)		
River	Belawan			Deli			Ular		
H - Q	Q = from Table			Q = from Table			Q = from Table		
Year	Date	H (m)	Q (m3/s)	Date	H (m)	Q (m3/s)	Date	H (m)	Q (m3/s)
1980	10/Oct	4.00	122.0	6/Dec	3.90	90.2	21/Dec	2.68	387.0
1981	18/Nov	4.50	137.0	29/Oct	3.58	79.5	11/May	1.60	230.0
1982	17/Sep	2.45	55.5	X	X	X	2/Feb	1.80	242.0
1983	13/Oct	3.55	99.0	X	X	X	X	X	X
1984	X	X	X	27/Jul	4.35	101.0	24/Apr	1.97	253.0
1985	X	X	X	6/Nov	4.60	110.0	18/Dec	1.78	243.0
1986	X	X	X	3/Feb	4.75	112.0	8/Jan	1.22	146.0
1987	X	X	X	X	X	X	X	X	X
1988	X	X	X	X	X	X	X	X	X
1989	9/Aug	4.00	117.0	24/Nov	4.55	104.0	24/Sep	2.44	254.0

Table 2-3 CENSUS POPULATION IN THE STUDY AREA, NORTH SUMATRA PROVINCE AND INDONESIA

(Unit : 1,000 persons)

Administrative Units	Population				Average Annual Growth Rate (%)		
	1961	1971	1980	1990	1961-1971	1971-1980	1980-1990
Indonesia	97,085	118,368	147,490	179,322	2.10	2.32	1.97
North Sumatra Province	4,965	6,622	8,361	10,256	2.95	2.60	2.06
Study Area	-	2,233	2,870	3,629	-	2.83	2.37
Kab. Deli Serdang	972	1,431	1,241	1,603	3.99	-1.55	2.59
Kab. Simalungun *1	-	136	158	178	-	1.68	1.23
Kodya Medan	479	636	1,379	1,731	2.90	12.99	2.30
Kodya Tebing Tinggi	26	30	92	117	1.47	2.69	2.40

Sources: - Hasil Sensus Punduduk 1990, Indonesia, Sumatera Utara, Kab.Deli Serdang, Kodya. Medan and Kodya. Tebing Tinggi.
- Statistical Year Book of Indonesia, 1990, Biro Pusat Statistik.

Note : *1 Seven Kecamatans in the Study Area.

Table 2-4 LAND USE IN KABUPATEN DELI SERDANG, 1976 and 1985

No.	Land Use	1976 (ha)	1976 %	1985 (ha)	1985 %	Changes
1.	Residential Area	17,883	4.02	20,022	4.49	+ 11.96
2.	Paddy Field					
	1 x Paddy /Year	71,000	15.95	47,371	10.63	- 33.31
	2 x Paddy /Year	22,067	4.96	45,419	10.19	+ 105.82
3.	Large Scale Plantation	136,768	30.72	135,461	30.40	- 0.96
4.	Public Plantation	31,397	7.05	33,458	7.51	+ 6.65
5.	Dry Land	81,002	18.19	84,112	18.88	+ 3.84
6.	Forest	76,200	17.12	73,153	16.42	- 3.99
7.	Pond	940	0.21	1,073	0.24	+ 14.15
8.	Swampy Area	3,216	0.72	2,568	0.58	- 30.72
9.	Scrub, Alang-alang Grass	4,742	1.07	2,407	0.54	- 49.24
10.	Special Use	-	-	510	0.11	- 100.00
	T o t a l	445,215	100.00	445,554	100.00	

Table 2-5 BUDGET OF CENTRAL GOVERNMENT, INDONESIA

(Unit : Rp Billion)

Year	Receipt			Expenditure		
	Routine	Development	Total	Routine	Development	Total
1985/86	19,252	3,572	22,824	11,951	10,873	22,824
1986/87	16,141	5,752	21,893	13,559	8,332	21,891
1987/88	20,803	6,158	26,961	17,482	9,477	26,959
1988/89	23,004	9,991	32,995	20,739	12,251	32,990
1989/90	28,740	9,429	38,169	24,331	13,834	38,165
Average Annual Growth Rate (%)	10.54	27.46	13.72	19.45	6.21	13.72

Source : Statistical Year Book of Indonesia, 1989 & 1990, Biro Pusat Statistik.

Table 2-6 GROSS DOMESTIC PRODUCT (GDP) AT CURRENT MARKET PRICES BY INDUSTRIAL ORIGIN, INDONESIA

(Unit : Rp. Billion)

Industrial Origin	Year 1985	1986	1987	1988	1989	Average Annual Growth Rate (%) (1985-1989)
1. Agriculture, Forestry & Fishery	22,413.2 (23.7)	24,750.5 (24.1)	29,116.0 (23.3)	34,193.4 (24.1)	38,998.4 (23.4)	14.9
2. Mining & Quarrying	15,403.6 (16.3)	11,502.8 (11.2)	17,266.8 (13.8)	17,161.8 (12.1)	21,729.6 (13.1)	9.0
3. Manufacturing Industries	12,903.8 (13.6)	17,184.7 (16.8)	21,150.4 (16.9)	26,252.4 (18.5)	30,573.3 (18.4)	24.1
4. Electricity, Gas & Water Supply	781.3 (0.8)	647.1 (0.6)	746.9 (0.6)	869.0 (0.6)	1,008.3 (0.6)	6.6
5. Construction	5,301.8 (5.6)	5,313.8 (5.2)	6,087.4 (4.9)	7,169.2 (5.0)	8,884.2 (5.3)	13.8
6. Trade, Hotel & Restaurant	14,697.5 (15.5)	17,083.4 (16.7)	21,048.3 (16.9)	24,379.2 (17.2)	28,314.1 (17.0)	17.8
7. Transportation & Communication	6,050.5 (6.4)	6,406.9 (6.2)	7,442.6 (6.0)	8,139.6 (5.7)	9,085.0 (5.5)	10.7
8. Banking & Other Financial Intermediaries	2,802.4 (3.0)	4,058.8 (4.0)	4,795.1 (3.8)	5,322.4 (3.7)	6,550.8 (3.9)	23.6
9. Ownership of Dwelling	2,443.0 (2.6)	2,976.0 (2.9)	3,349.1 (2.7)	3,736.0 (2.6)	4,154.9 (2.5)	14.2
10. Public Administration & Defence	7,925.1 (8.4)	8,307.3 (8.1)	8,911.8 (7.1)	9,446.2 (6.7)	11,174.2 (6.7)	9.0
11. Services	3,998.6 (4.2)	4,314.6 (4.2)	4,902.5 (3.9)	5,351.1 (3.8)	5,856.7 (3.5)	10.0
G D P	94,720.8 (100)	102,545.9 (100)	124,816.9 (100)	142,020.3 (100)	166,329.5 (100)	15.1

Source : Statistical Year Book of Indonesia, 1988 & 1989, Biro Pusat Statistik.
Note : Figures in Parenthesis indicate distribution in percent.

Table 2-7 TREND OF EXTERNAL TRADE OF INDONESIA, 1980-1990

(Unit : Million US$)

Year	Including Petroleum and Gas			Exluding Petroleum and Gas		
(1)	Exports (2)	Import (3)	Balance (4)=(2)-(3)	Exports (5)	Import (6)	Balance (7)=(5)-(6)
1980	23,950.4	10,834.4	13,116.0	6,168.8	9,085.9	(2,917.1)
1981	25,164.5	13,272.1	11,892.4	4,501.3	11,550.4	(7,049.1)
1982	22,328.3	16,858.9	5,469.4	3,929.2	13,314.1	(9,384.9)
1983	21,145.9	16,351.8	4,794.1	5,005.3	12,207.0	(7,201.7)
1984	21,887.8	13,882.1	8,005.7	5,869.7	11,185.3	(5,315.6)
1985	18,586.7	10,259.1	8,327.6	5,868.8	8,987.5	(3,118.7)
1986	14,805.0	10,718.4	4,086.6	6,528.4	9,632.0	(3,103.6)
1987	17,135.6	12,370.3	4,765.3	8,579.5	11,302.3	(2,722.8)
1988	19,218.5	13,248.5	5,970.0	11,536.9	12,339.4	(802.5)
1989	22,158.9	16,359.6	5,799.3	13,480.1	15,164.4	(1,684.3)
1990	25,801.2	20,103.8	5,697.4	14,679.3	18,696.5	(4,017.2)

Source : Statistical Year Book of Indonesia, 1990, Biro Pusat Statistik

Note : Figures in parenthesis indicate negative.

Table 2-8 GROSS REGIONAL DOMESTIC PRODUCT (GRDP) OF NORTH SUMATRA PROVINCE BY INDUSTRIAL ORIGIN AT CURRENT MARKET PRICES

(Unit : Rp Million)

Industrial Origin	Year 1983	1984	1985	1986	1987	1988	Average Annual Growth Rate (%) 1983-1988
1. Agriculture, Forestry & Fishery	1,135.2 (32.7)	1,407.0 (32.3)	1,580.0 (33.6)	1,790.9 (34.6)	2,311.4 (35.9)	2,779.2 (36.6)	19.6
2. Mining & Quarrying	187.8 (5.4)	277.8 (6.4)	240.7 (5.1)	181.4 (3.5)	206.2 (3.2)	196.5 (2.6)	0.9
3. Manufacturing Industries	466.2 (13.4)	636.5 (14.6)	700.9 (14.9)	803.9 (15.5)	999.4 (15.5)	1,220.3 (16.1)	21.2
4. Electricity, Gas & Water Suplay	25.0 (0.7)	35.8 (0.8)	46.3 (1.0)	55.1 (1.1)	63.7 (1.0)	76.6 (1.0)	25.1
5. Contruction	158.9 (4.6)	172.2 (3.9)	174.9 (3.7)	179.6 (3.5)	194.9 (3.0)	225.0 (3.0)	7.2
6. Trade, Hotel & Restaurant	538.2 (15.5)	638.1 (14.6)	663.3 (14.1)	745.7 (14.4)	1,055.2 (16.4)	1,256.9 (16.6)	18.5
7. Transportation & Communication	371.3 (10.7)	456.4 (10.5)	498.7 (10.6)	530.7 (10.2)	590.3 (9.2)	689.5 (9.1)	13.2
8. Financial Inter-mediaries, Ownership of Dwelling and Business Services	211.6 (6.1)	256.1 (5.9)	288.8 (6.1)	322.9 (6.2)	392.2 (6.1)	451.3 (5.9)	16.4
9. Social Community & Personal Services	379.4 (10.9)	482.2 (11.1)	508.2 (10.8)	571.8 (11.0)	626.6 (9.7)	696.9 (9.2)	12.9
G R D P	3,473.6 (100.0)	4,362.1 (100.0)	4,701.8 (100.0)	5,182.0 (100.0)	6,439.9 (100.0)	7,592.2 (100.0)	17.1

Source : North Sumatra in Figures, 1988 & 1989, Statistical Office of North Sumatra Province.

Note : Figures in parenthesis indicate distribution in percent.

Table 2-9 GDP OF INDONESIA, AND GRDP OF NORTH SUMATRA PROVINCE AND THE STUDY AREA

(Unit : Rp Billion)

Region	Year						Average Annual Growth Rate(%) (1983-1988)
	1983	1984	1985	1986	1987	1988	
1. At Current Prices							
Indonesia	-	87,054.8	94,720.8	102,545.9	124,816.9	142,020.3	13.1
		(-)	(8.8)	(8.3)	(21.7)	(13.8)	
North Sumatra Prov.	3,473.7	4,362.1	4,701.8	5,182.1	6,439.9	7,592.3	17.1
	(-)	(25.6)	(7.8)	(10.2)	(24.3)	(17.9)	
Study Area	1,294.8	1,583.8	1,717.1	1,917.1	2,384.0	2,765.1	16.5
	(-)	(22.3)	(8.4)	(11.6)	(24.4)	(16.0)	
Kab. Deli Serdang	379.8	487.4	546.4	614.6	774.1	893.7	18.9
	(-)	(28.3)	(12.1)	(12.5)	(26.0)	(15.5)	
Kodya. Medan	871.3	1,041.9	1,110.4	1,236.4	1,533.2	1,782.8	15.6
	(-)	(19.6)	(6.6)	(11.3)	(24.0)	(16.3)	
Kodya. tebing Tinggi	43.7	54.5	60.3	66.1	76.7	88.6	15.3
	(-)	(24.7)	(10.6)	(9.6)	(16.0)	(15.5)	
II. At 1983 Constant Prices							
Indonesia	-	78,144.4	80,119.6	90,013.6	94,517.8	99,936.0	6.4
		(-)	(2.5)	(12.3)	(5.0)	(5.7)	
North Sumatra Prov.	3,473.7	3,734.7	3,886.5	4,131.7	4,439.4	4,759.8	6.5
	(-)	(7.5)	(4.1)	(6.3)	(7.4)	(7.2)	
Study Area	1,294.8	1,377.2	1,428.7	1,524.3	1,654.2	1,756.0	6.3
	(-)	(6.4)	(3.7)	(6.7)	(8.5)	(6.2)	
Kab. Deli Serdang	379.8	422.2	453.9	496.9	536.6	562.7	8.2
	(-)	(11.2)	(7.5)	(9.5)	(8.0)	(4.9)	
Kodya. Medan	871.3	907.7	924.7	974.6	1,062.8	1,135.3	5.5
	(-)	(4.2)	(1.9)	(5.4)	(9.0)	(6.8)	
Kodya. Tebing Tinggi	43.7	47.3	50.1	52.8	54.8	58.0	5.8
	(-)	(8.2)	(5.9)	(5.4)	(3.8)	(5.8)	

Souces : Statistical Year Book of Indonesia, 1989 & 1990, Biro Pusat Statistik.
North Sumatra in Figures, 1988 & 1989, Statistical Office of North Sumatra Province.

Note : Figures in parenthesis indicate a growth rate in percent every year.

Table 2-10 AREA HARVESTED, PRODUCTION AND YIELD RATE OF MAJOR FOOD CROPS IN NORTH SUMATRA PROVINCE

Crops	1984	1985	1986	1987	1988	1989
1. Paddy						
Area harvested(1.000 ha)	583.06	612.35	582.46	656.65	672.89	679.42
Production (1.000 tons)	2,022.00	2,148.92	2,067.88	2,319.19	2,482.94	2,540.87
Yield rate(tons/ha)	3.47	3.51	3.55	3.53	3.89	3.74
2. Wetland Paddy						
Area harvested(1.000 ha)	496.25	525.43	505.83	569.45	592.78	599.52
Production (1.000 tons)	1,843.08	1,977.87	1,913.33	2,152.15	2,318.14	2,369.84
Yield rate(tons/ha)	3.71	3.76	3.78	3.78	3.91	3.95
3. Dryland Paddy						
Area harvested(1.000 ha)	86.81	86.92	76.52	87.20	80.11	79.90
Production (1.000 tons)	178.92	171.06	154.50	167.05	164.80	171.03
Yield rate(tons/ha)	2.06	1.97	2.02	1.92	2.06	2.14
4. Maize						
Area harvested(1.000 ha)	33.85	46.91	58.87	63.79	82.76	86.82
Production (1.000 tons)	64.35	90.68	109.37	140.68	168.28	175.99
Yield rate(tons/ha)	1.90	1.93	1.86	2.21	2.03	2.03
5. Cassava						
Area harvested(1.000 ha)	21.88	19.02	19.79	20.82	26.77	37.88
Production (1.000 tons)	255.96	230.12	247.36	245.17	327.66	488.69
Yield rate(tons/ha)	11.70	12.10	12.50	11.80	12.24	12.90
6. Sweet Potato						
Area harvested(1.000 ha)	15.86	14.84	14.34	13.66	16.00	18.61
Production (1.000 tons)	147.53	137.99	131.88	129.79	155.44	182.94
Yield rate(tons/ha)	9.30	9.30	9.20	9.50	9.71	9.83
7. Peanut						
Area harvested(1.000 ha)	11.84	13.08	12.24	18.97	24.64	26.81
Production (1.000 tons)	13.23	15.45	14.96	20.13	28.50	31.30
Yield rate(tons/ha)	1.12	1.18	1.22	1.06	1.16	1.17
8. Soyabean						
Area harvested(1.000 ha)	8.05	11.40	21.97	26.01	29.96	24.21
Production (1.000 tons)	6.77	10.13	20.27	27.99	29.98	24.76
Yield rate(tons/ha)	0.84	0.89	0.92	1.08	1.00	1.02

Source : North Sumatra in Figures, 1988 & 1989, Statistical Office of North Sumatra Province

Table 2-11 AREA HARVESTED, PRODUCTION AND YIELD RATE OF MAJOR FOOD CROPS IN THE STUDY AREA, 1988 AND 1989

Crops	Kab. Deli Serdang		Kab. Simalungun		Kodya. Medan	
	1988	1989	1988	1989	1988	1989
1. Paddy						
Area harvested(1.000 ha)	134.3	137.9	82.7	94.2	5.7	5.8
Production (1.000 tons)	535.2	567.2	307.1	352.5	23.2	24.1
Yield rate(tons/ha)	3.99	4.12	3.71	3.74	4.07	4.18
2. Wetland Paddy						
Area harvested(1.000 ha)	128.6	134.2	67.3	73.2	5.7	5.8
Production (1.000 tons)	523.6	559.5	276.4	308.6	23.2	24.1
Yield rate(tons/ha)	4.07	4.17	4.11	4.22	4.07	4.18
3. Dryland Paddy						
Area harvested(1.000 ha)	5.7	3.6	15.4	21.0	-	-
Production (1.000 tons)	11.6	7.7	30.7	44.0	-	-
Yield rate(tons/ha)	2.04	2.12	2.00	2.10	-	-
4. Maize						
Area harvested(1.000 ha)	8.3	9.4	30.2	38.6	0.17	0.25
Production (1.000 tons)	14.9	17.0	67.6	86.5	0.30	0.46
Yield rate(tons/ha)	1.79	1.81	2.24	2.25	1.79	1.81
5. Cassava						
Area harvested(1.000 ha)	6.6	10.9	3.6	7.0	0.27	0.43
Production (1.000 tons)	93.0	154.8	58.9	119.5	3.83	6.08
Yield rate(tons/ha)	14.07	14.22	16.42	17.05	14.13	14.17
6. Sweet Potato						
Area harvested(1.000 ha)	1.4	1.7	1.9	1.9	0.18	0.25
Production (1.000 tons)	14.8	18.7	28.8	29.8	2.03	2.69
Yield rate(tons/ha)	10.98	11.00	15.53	15.66	11.02	10.99
7. Peanut						
Area harvested(1.000 ha)	2.3	2.1	7.4	8.8	0.18	0.21
Production (1.000 tons)	2.7	2.7	8.2	9.9	0.21	0.28
Yield rate(tons/ha)	1.18	1.31	1.10	1.13	1.16	1.32
8. Soyabean						
Area harvested(1.000 ha)	1.8	2.0	4.7	3.5	0.07	0.12
Production (1.000 tons)	2.2	2.6	5.6	4.3	0.09	0.15
Yield rate(tons/ha)	1.21	1.28	1.20	1.24	1.18	1.27

Source : North Sumatra in Figures, 1988 & 1989, Statistical Office of North Sumatra Province.

Table 2-12 PLANTED AREA, PRODUCTION AND YIELD RATE OF RUBBER AND OIL PALM IN NORTH SUMATRA PROVINCE, 1988 -1989

Holders	Rubber						Oil Palm									
	Planted Area(ha)*1		Production (tons)		Yield Rate (kg/ha)		Planted Area(ha)*1		Production (tons)				Yield Rate (kg/ha)			
									MS *2		IS *3		MS *2		IS *3	
	1988	1989	1988	1989	1988	1989	1988	1989	1988	1989	1988	1989	1988	1989	1988	1989
Small Holders	310,293	325,540	117,261	120,227	378	369	58,299	66,893	90,925	74,704	12,562	9,950	1,560	1,117	215	149
Private Estates	103,814	208,634	-	114,874	-	551	147,914	172,582	-	346,022	-	47,166	-	2,005	-	273
Estate Enterprises II - IX	107,490	112,894	99,975	100,043	930	886	333,072	330,396	853,903	891,476	188,538	121,566	2,564	2,698	566	368
Total	521,597	647,068	-	335,144	-	518	539,285	569,871	-	1,312,202	-	178,682	-	2,303	-	314

Source : North Sumatra in Figures, 1988 & 1989, Statistical Office of North Sumatra Province.
Note : *1 includes non - productive areas.
*2 MS means crude palm oil.
*3 IS means palm kernel.

Table 2-13 NUMBER OF ESTABLISHMENTS AND EMPLOYEES BY INDUSTRIAL ORIGIN IN NORTH SUMATRA PROVINCE AND THE STUDY AREA, 1986

Industrial Origin	Number of Establishments					Number of Employees				
	North Sumatra	Study Area				North Sumatra	Study Area			
		Deli Serdang	Medan	Tebing Tinggi	Total		Deli Serdang	Medan	Tebing Tinggi	Total
1 Mining & Quarrying	1,581	195	13	7	215	5,885	822	101	66	989
2 Manufacturing Industry	30,994	4,572	5,523	296	10,391	164,861	32,864	40,939	3,581	77,384
3 Electricity,Gas & Water Supply	2,787	498	13	6	517	8,789	763	3,659	43	4,465
4 Construction	4,144	292	1,101	164	1,557	18,032	1,422	6,567	474	8,463
5 Trade,Hotel & Restaurant	208,711	30,755	53,605	3,988	88,348	310,147	42,061	92,651	5,686	140,398
6 Transport & Communication	31,984	2,926	13,194	1,288	17,408	51,639	4,564	20,795	1,590	26,949
7 Banking & Financial Intermediaries	4,044	336	1,677	38	2,051	14,836	506	8,592	214	9,312
8 Services	42,594	6,031	13,823	932	20,786	101,324	14,171	39,138	2,663	55,972
Total	326,839	45,605	88,949	6,719	141,273	675,513	97,173	212,442	14,317	323,932

Saurce : North Sumatra in Figures, 1989, Statistical Office of North Sumatra Province.

Table 2-14 INCOME AND EXPENDITURE OF NORTH SUMATRA AUTONOMY GOVERNMENT, 1980/81-1988/89

(Unit : Rp Million)

Year	Income			Expenditure		
	Routine	Development	Total	Routine	Development	Total
1980/81	73,320	20,429	93,749	66,209	21,600	87,809
1981/82	93,467	16,823	110,290	83,184	20,985	104,169
1982/83	106,004	12,452	118,456	96,779	23,172	119,951
1983/84	127,085	13,554	140,639	112,955	21,210	134,165
1984/85	128,785	13,300	142,085	109,581	20,008	129,589
1985/86	169,015	14,463	183,478	147,014	26,220	173,234
1986/87	180,030	16,691	196,721	155,427	31,037	186,464
1987/88	199,140	18,935	218,075	168,853	36,348	205,201
1988/89	279,702	23,133	302,835	245,681	44,674	290,356
Average Annual Growth Rate (%)	18.22	1.57	15.79	17.81	9.51	16.12

Source : North Sumatra in Figures, 1988, Statistical Office of North Sumatra Province.

Table 3-1 OUTLINE OF THE DPUP FLOOD CONTROL PLAN

No.	Item	Deli R. Downstream	Deli R. Upstream	Babura R.	Percut R.	Serdang R. (Belumai R.)	Batugingging R.	Padang R.
1.	Year of Planning	1985	1988	1988	1988	1983	1983	1988
2.	Location	River mouth to Babura R.	Babura R. to Titi Kuning	Deli R. to Selayang 2	River mouth to Sidorejo	River mouth to national road	Serdang R. to national road	Manggadua to national road
3.	Length (km)	28	12	14	20	9 (13)**	10	15
4.	Return Period (year)	10	10	10	10	10	10	20
5.	Design Discharge (m3/s)	455(408)*	267	139	379	630 (260)**	410	1450
6.	Standard Cross Section of River Channel							
	(1) Section	Double and Single	Single	Single	Double and Single	Double(Single)**	Single	Double
	(2) Width (m)	38 to 63	27 to 36	21 to 33	25 to 57	65(44)**	55	150
	(3) Depth (m)	6	4 to 7	4 to 8	6 to 10	5	5	5 to 6
	(4) Slope of Dike	1 : 1.5	1 : 1.5	1 : 1.5	1 : 1 (Protection with concrete block)	1 : 2 (Sandy Soil)	1:2 (Sandy Soil)	1 : 1
	(5) Crown Width of Dike (m	3	4	4	3	3	3	4
	(6) Freeboard (m)	0.6	0.6	0.6	0.6	0.6	0.6	0.6
7.	Roughness Coefficient: n	0.03	0.03	0.03	0.03 for low channel 0.035 for high channel	0.025	0.025	0.025
8.	Design Bed Slope	1/2830 to 1/890	1/2400 to 1/280	1/1210 to 1/380	1/2460 to 1/610	1/1630 to 1/1080	1/2070	1/1020
9.	Schedule of Construction	Start in 1989	1995 to 2007	1995 to 2007	1995 to 2007	Not fixed	Not fixed	Not fixed
10.	Financial Source for Construction	OECF and ADB	Foreign loan	Foreign loan	Foreign loan	Foreign loan	Foreign loan	Foreign loan

Note
* : The design discharge of the upstream of confluence with Sikambing R. is 408 m3/s, and that of the down stream is 455 m3/s.
** : The figure in parenthesis shows the one for Belumai R.

Table 3-2 CALCULATION RESULTS OF PROBABLE RAINFALL

(Unit : mm/day)

Year	Belawan	Deli	Percut	Serdang	Ular	Belutu	Padang
2	68.9	66.3	67.9	60.4	86.6	59.6	79.9
3	78.6	76.0	77.2	66.7	101.7	67.5	92.2
5	89.4	86.8	87.6	73.8	118.6	76.3	105.9
8	98.7	96.1	96.5	79.9	133.2	83.9	117.7
10	103.0	100.4	100.6	82.7	139.9	87.4	123.2
20	116.0	113.5	113.1	91.3	160.2	98.0	139.7
30	123.5	121.0	120.3	96.2	172.0	104.1	149.2
50	132.8	130.4	129.2	102.4	186.6	111.8	161.1
60	136.2	133.7	132.4	104.6	191.8	114.5	165.4
80	141.4	139.0	137.5	108.0	200.0	118.7	172.0
100	145.4	143.0	141.4	110.7	206.4	122.0	177.2
150	152.8	150.4	148.4	115.5	217.9	128.0	186.5
200	158.0	155.6	153.4	118.9	226.0	132.3	193.2

Table 3-3 PROBABLE FLOOD DISCHARGES

River/ Reference Point	Catchment Area (km2)	Probable Flood Discharge (m3/s)						
		2-yr.	5-yr.	10-yr.	20-yr.	30-yr.	50-yr.	100-yr.
1. Belawan								
- Lalang	254	250	340	410	470	510	550	610
2. Deli								
- Titi Kuning	180	160	220	260	300	320	340	380
- Helvetia*	341	280	390	460	530	570	620	690
3. Percut								
- Tembakau	171	140	190	230	260	280	300	340
4. Serdang								
- Baru	671	470	590	680	750	800	850	940
Batugingging								
- Gang Melaya	343	280	340	390	420	450	480	520
Belumai								
- Buntu	262	190	230	270	290	310	330	360
5. Ular								
- Pulau Tagor	1013	430	600	710	820	890	970	1070
6. Belutu								
- Bakaran Batu	243	110	140	160	180	190	210	230
- Sei Rampah*	423	180	220	260	290	310	340	370
7 . Padang								
- Brohol	759	390	530	620	720	770	840	940

* Sub-Reference Point

Table 3-4 APPRAISED VALUE OF ASSETS

1. Buildings and Household Effects

(Unit: Thousand Rp.)

Kind	Building	Household Effects
Farmhouse	3,000	1,500
Residential	5,000	3,000
Shop	8,000	11,000
Office	70,000	75,000
School	40,000	10,000
Hospital	30,000	12,000
Factory	30,000	25,000
Mosque (or Church)	15,000	4,000

2. Agricultural Crops

Crops	ton/ha	Rp/ton (Mill.)	Rp/ha (Mill.)
Paddy (Rainfed)	4.1	0.407	1.669
Paddy (Tidal Irrig.)	2.0	0.407	0.814
Rubber	1.0	0.143	0.143
Coconut	1.0	0.102	0.102
Palm oil	0.86	0.687	0.591
Palm kernel	0.16	0.402	0.064
Cacao	0.5	2.062	1.031
Tobacco	0.5	4.300	2.150
Maize	1.8	0.185	0.333
Cassava	14.1	0.084	1.184
Potato	11.0	0.106	1.165
Peanut	1.2	0.720	0.864
Soyabean	1.2	0.688	0.826
Green Pea	0.8	0.989	0.791

Table 3-5 DAMAGE RATE TO SUBMERGED ASSETS

(1) Buildings

Water Level Above Floor (meter)	Damage Rate
0.00 - 0.49	0.037
0.50 - 0.99	0.064
1.00 - 1.49	0.099
1.50 - 1.99	0.137
2.00 - 2.49	0.179

(2) Household Effects

Kind of Building	Water Level Above Floor (meter)						
	0 - 0.5	0.5 - 1.0	1.0 - 1.5	1.5 - 2.0	2.0 - 2.5	2.5 - 3.0	over 3.0
Farm house	0.448	0.621	0.656	0.676	0.690	0.690	0.690
Residential	0.407	0.600	0.642	0.622	0.683	0.690	0.690
Shop	0.251	0.448	0.543	0.561	0.579	0.597	0.597
Office, etc.(1	0.411	0.575	0.613	0.626	0.632	0.632	0.632

(1 : Office, school, hospital, factory, mosque, church and kiosk.

(3) Paddy

Unit : %

Submergence		Tillering Stage	Booling Stage	Heading Stage	Ripening Stage
Depth	Duration (day)	0 - 70 th day (0 - 54 %)	71 - 87 th (55 - 67 %)	88 - 100 th (68 - 77 %)	101 - 130 th (78 - 100 %)
Case (A)	1 to 2	10	70	30	5
Over	3 to 4	20	80	80	20
Plant	5 to 6	30	85	90	30
Height	Over 7	35	95	100	30
Case (B)	1 to 2	6	40	10	4
75 % of	3 to 4	9	46	23	15
Plant	5 to 6	14	49	26	23
Height	Over 7	16	55	30	23
Case (B)	1 to 2	4	37	8	2
50 % of	3 to 4	9	42	22	4
Plant	5 to 6	13	45	25	6
Height	Over 7	15	50	28	6

(4) Tree Crops

Inundation Depth (m)	Damage Rate (%)
0.00 - 0.49	5
0.50 - 0.99	10
1.00 - 1.49	20
1.50 - 1.99	40
2.00 - 2.49	80
over 2.50	100

(5) Upland Crops

Inundation Depth (m)		Damage Rate (%)
Depth (m)	Duration (days)	
0.00 - 0.49	3 - 5	35
0.50 - 0.99	4 - 6	67
1.00 - 1.49	5 - 7	85
1.50 - 1.99	5 - 7	95
2.00 - 2.49	over 7	99

Table 3-6(1/2) FLOOD DAMAGE BY VARIOUS FLOODS

*** Belawan River *** (Unit : Mil. Rp.)

RETURN PERIOD (Year)	Wet Paddy	Farm Land	Palm Oil	Rubber	Cacao	Other Plantation	House	Factory	School	Office	Hospital	Mosque/ Church	Public Works Structure	TOTAL
100	130.60	410.85	2.81	0.00	0.00	114.70	8,006.15	34.83	185.98	175.41	17.82	71.77	2,887.27	12,038.18
50	130.60	390.13	2.36	0.00	0.00	94.08	6,690.40	23.22	127.68	154.02	0.00	56.79	2,397.72	10,066.99
30	130.60	390.13	2.36	0.00	0.00	91.50	6,486.47	23.22	127.68	154.02	0.00	56.79	2,328.38	9,791.15
20	110.15	339.22	1.77	0.00	0.00	78.61	6,067.15	0.00	119.70	102.68	0.00	56.79	2,157.75	9,033.83
10	110.15	257.22	0.89	0.00	0.00	65.73	4,288.10	0.00	79.80	102.68	0.00	41.02	1,533.94	6,479.53

*** Deli River *** (Unit : Mil. Rp.)

RETURN PERIOD (Year)	Wet Paddy	Farm Land	Palm Oil	Rubber	Cacao	Other Plantation	House	Factory	School	Office	Hospital	Mosque/ Church	Public Works Structure	TOTAL
100	12.52	109.22	0.15	0.04	1.29	10.31	58,152.36	2,175.16	842.78	1,287.10	0.00	316.76	21,343.21	84,250.89
50	10.85	106.26	0.15	0.04	1.29	10.31	56,229.80	1,943.98	813.44	1,211.82	0.00	307.86	20,572.35	81,208.14
30	10.85	106.26	0.15	0.04	1.29	10.31	52,640.54	1,853.38	774.78	1,190.43	0.00	291.17	19,295.10	76,174.30
20	10.85	106.26	0.15	0.04	1.29	9.02	49,588.94	1,716.61	683.32	1,036.41	0.00	281.71	18,124.37	71,558.96
10	10.85	106.26	0.15	0.04	0.00	7.73	42,560.10	1,525.01	543.22	862.61	0.00	236.72	15,547.40	61,400.08
5	10.85	81.99	0.15	0.04	0.00	7.73	41,367.42	1,412.13	531.56	834.27	0.00	231.35	15,088.09	59,565.57
2	10.85	72.52	0.15	0.04	1.29	7.73	30,239.15	951.15	413.72	586.13	0.00	166.69	11,001.32	43,450.73

*** Percut River *** (Unit : Mil. Rp.)

RETURN PERIOD (Year)	Wet Paddy	Farm Land	Palm Oil	Rubber	Cacao	Other Plantation	House	Factory	School	Office	Hospital	Mosque/ Church	Public Works Structure	TOTAL
100	338.81	51.80	0.44	0.00	5.16	69.59	11,530.80	46.44	143.02	0.00	0.00	82.95	4,013.09	16,282.09
50	338.81	51.80	0.44	0.00	2.58	59.28	10,475.10	46.44	143.02	0.00	0.00	82.95	3,654.15	14,854.57
30	325.46	41.44	0.44	0.00	2.58	51.55	10,205.83	46.44	139.34	0.00	0.00	80.06	3,560.36	14,453.49
20	313.35	31.08	0.30	0.00	2.58	51.55	9,937.32	11.61	139.34	0.00	0.00	78.61	3,456.74	14,022.47
10	289.99	31.08	0.30	0.00	1.29	48.97	7,409.50	11.61	131.36	0.00	0.00	59.68	2,588.13	10,571.91
5	284.56	31.08	0.30	0.00	1.29	45.11	6,705.87	11.61	103.74	0.00	0.00	55.08	2,337.94	9,576.58

Table 3-6(2/2) FLOOD DAMAGE BY VARIOUS FLOODS

*** Serdang River ***

(Unit : Mil. Rp.)

RETURN PERIOD (Year)	Wet Paddy	Farm Land	Palm Oil	Rubber	Cacao	Other Plantation	House	Factory	School	Office	Hospital	Mosque/ Church	Public Works Structure	TOTAL
100	1,224.63	71.63	8.72	0.11	0.00	0.00	14,656.69	447.91	259.62	372.21	0.00	91.09	5,381.35	22,513.95
50	1,151.19	62.16	8.72	0.11	0.00	0.00	13,884.61	402.61	248.58	372.21	0.00	88.20	5,098.71	21,317.09
30	1,121.15	62.16	8.72	0.11	0.00	0.00	13,400.19	348.25	230.18	329.43	0.00	83.86	4,893.25	20,477.29
20	1,091.94	62.16	8.72	0.11	0.00	0.00	13,195.63	343.20	230.18	329.43	0.00	83.86	4,821.98	20,167.21
10	1,072.33	51.80	8.42	0.11	0.00	0.00	12,724.51	331.59	206.24	329.43	0.00	83.86	4,649.71	19,458.00
5	1,040.62	41.44	7.83	0.07	0.00	0.00	11,835.18	331.59	174.94	329.43	0.00	77.82	4,334.64	18,173.56
2	890.83	31.08	7.39	0.00	0.00	0.00	10,283.63	238.71	166.96	329.43	0.00	62.04	3,767.46	15,777.53

*** Belutu River ***

(Unit : Mil. Rp.)

RETURN PERIOD (Year)	Wet Paddy	Farm Land	Palm Oil	Rubber	Cacao	Other Plantation	House	Factory	School	Office	Hospital	Mosque/ Church	Public Works Structure	TOTAL
100	629.63	236.50	4.43	0.00	2.58	0.00	2,848.86	13.05	99.10	56.55	0.00	51.15	1,043.36	4,985.22
50	602.09	236.50	4.14	0.00	2.58	0.00	2,796.60	12.45	93.40	56.55	0.00	51.15	1,023.45	4,878.91
30	553.27	195.95	3.55	0.00	2.58	0.00	2,619.60	12.45	82.00	56.55	0.00	49.00	958.66	4,533.61
20	545.35	175.23	3.40	0.00	2.58	0.00	2,578.76	12.45	82.00	56.55	0.00	49.00	944.78	4,450.09
10	514.89	154.51	3.10	0.00	2.58	0.00	1,938.32	12.45	64.00	43.70	0.00	34.75	711.69	3,479.99
5	486.10	144.15	2.96	0.00	2.58	0.00	1,891.52	12.45	64.00	43.70	0.00	32.60	695.05	3,375.10
2	461.06	51.80	2.36	0.00	2.58	0.00	1,657.82	12.45	58.30	38.55	0.00	28.45	610.49	2,923.87

*** Padang River ***

(Unit : Mil. Rp.)

RETURN PERIOD (Year)	Wet Paddy	Farm Land	Palm Oil	Rubber	Cacao	Other Plantation	House	Factory	School	Office	Hospital	Mosque/ Church	Public Works Structure	TOTAL
100	1,305.99	201.28	4.58	1.14	0.00	0.00	15,086.15	594.06	520.04	350.82	21.75	160.70	5,689.40	23,935.91
50	1,291.81	201.28	4.43	1.14	0.00	0.00	13,336.49	375.48	461.74	248.14	17.82	142.83	4,958.05	21,039.21
30	1,260.51	201.28	4.43	1.14	0.00	0.00	12,868.31	375.48	454.38	248.14	17.82	141.39	4,795.87	20,368.75
20	1,177.48	190.92	4.43	1.14	0.00	0.00	12,561.94	375.48	444.68	248.14	17.82	141.39	4,688.41	19,851.83
10	1,084.85	180.56	4.43	1.14	0.00	0.00	10,175.78	308.37	310.12	102.68	8.91	102.11	3,742.71	16,021.67
5	950.50	161.62	4.43	1.14	0.00	0.00	9,041.00	250.32	263.48	102.68	8.91	86.60	3,316.02	14,186.69
2	886.66	161.62	4.28	0.82	0.00	0.00	8,462.89	238.71	251.82	102.68	8.91	78.35	3,108.74	13,305.47

Table 3-7 PRESENT WATER SUPPLY SYSTEM UNDER PDAM MEDAN

Code No.	Paying Consumers	Number	Consumption (m3/d)
1.	Mosque, Church, etc., and Public Tap	918	4,111
2-a.	House Connection	84,431	97,418
2-b.	Government Connection	888	6,910
3-a.	Small Commercial Establishment	4,259	6,125
3-b.	Big Commercial Establishment	6,413	11,203
4-a.	Small Industry	34	161
4-b.	Big Industry	102	893
5.	Special Use (Fire Tap, Others)	36	356
Total		97,081	127,177

Table 3-8 WATER TARIFF COLLECTION OF PDAM MEDAN IN MAY 1990

Item	Number of Units	Consumption (m3/day)	Ratio (%)
Domestic Water	84,616	95,058 (1,100)	75
Non-Domestic Water	11,696	32,836 (380)	25
- Institutional	888	6,710 (78)	
- Commercial	10,672	16,769 (194)	
- Industrial	136	1,020 (12)	
- Others	-	8,337 (96)	
Total	96,312	127,894 (1,480)	100

Note: Amounts in parentheses are in l/s.

Table 3-9 POSSIBLE DAM SITES AND THEIR FEATURES

Possible Dam Site	River System/ River	Location	Catchment Area (km2)	Distance from Estuary (km)	Road Distance from Medan/ Tebing Tinggi (km)	Present Condition		
						Topography	Land Use	Access
Tembengan	Belawan/Belawan	N3°27'E98°33'	76	60	25, Medan	Wide gorge	Paddy	No Good
Namobatang	Deli/Petani	N3°21'E98°37'	93	58	30, Medan	Wide gorge	Paddy	Good
Lausimeme	Percut/Seruai	N3°21'E98°39'	105	50	32, Medan	Narrow gorge Hilly land	Forest Dry field	No Good
Beranti	Serdang/Belumai	N3°21'E98°43'	159	52	33, Medan	Narrow gorge Hilly land	Forest Dry field	No Good
Buaya	Ular/Buaya	N3°21'E98°52'	428	44	60, Medan 45, T.Tinggi	Wide gorge	Paddy	Good
Karai	Ular/Karai	N3°21'E98°54'	500	44	65, Medan 38, T.Tinggi	Wide gorge	Paddy	No Good
Sibakudu	Belutu/Belutu	N3°14'E98°53'	64	60	35, T.Tinggi	Wide gorge	Paddy	No Good
Sampanan	Padang/Padang	N3°12'E99°03'	370	48	24, T.Tinggi	Wide gorge	Plantation	Fair

Table 3-10 TECHNICAL AND ECONOMICAL COMPARISON OF PLANNED DAMS

River System	Damsite	1) Catchment Area (km2)	2) Topographically Possible Reservoir Storage Capacity (MCM)	3) Sedimentation Capacity *1 (MCM)	4)=2)-3) Possible Effective Storage Capacity (MCM)	5) Annually Secured Effective Storage Capacity *2 (MCM)	6)=3)+5) Required Total Reservoir Storage Capacity (MCM)	7) Required Dam Height For 6) (m)	8) Impounding Surface Area For 6) (km2)	9) Quantity of Required Dam Body For 7) *3 (1000 m3)	10) Estimated Construction Cost For 9) (Billion Rp)	11)=10)/5) Estimated Construction Cost/Annually Secured Effective Storage Capacity (1000 Rp/m3)
Belawan	Tembengan	76	25.0	2.3	22.7	12.5	14.8	33	1.4	953	76.2	6.1
Deli	Namobatang	93	15.0	0.9	14.1	14.1	15.0	41	0.8	672	53.8	3.8
Percut	Lausimeme	105	60.0	1.1	58.9	19.5	20.6	61	1.1	750	60.0	3.1
Serdang	Beranti	159	15.0	8.0	7.0	7.0	15.0	38	0.9	668	53.4	7.6
Ular	Buaya	428	48.0	21.4	26.6	26.6	48.0	19	4.1	296	23.8	0.9
Ular	Karai	500	85.0	25.0	60.0	60.0	85.0	30	8.0	360	28.8	0.5
Belutu	Sibakudu	64	45.0	1.3	43.7	12.4	13.7	18	2.3	189	15.1	1.2
Padang	Sampanan	370	31.0	18.5	12.5	12.5	31.0	34	2.4	382	47.4	3.8

Note : *1 Accumulated sedimentation volume for a period of 100 years.(Refer to "Section 3.3.2")
*2 On condition that each reservoir is planned to be annually recovered to full.
*3 Quantity estimated considering a dam type as rock-fill.

Table 4-1 ECONOMIC COMPARISON OF FLOOD MITIGATION EFFECT OF STRUCTURES

River System & Flood Mitigation Structure	Catchment Area (km2)	Possible Flood Control Storage Capacity * (MCM)	Required Construction Cost (million RP.)	Reference Point & Catchment Area (km2)	Flood Mitigation Effect at R.P. W/O (m3/S)	Flood Mitigation Effect at R.P. W/ (m3/S)	Required Construction Cost for Unit Flood Mitigation Effect (million Rp./m3/S)
1. Belawan River(50-Yr.)				Lalang 254			
Tembengan Dam	76	1.8	30,000		550	410	214
Sembahe Baru Retarding Basin	155	5.1	116,300		550	150	291
2. Deli River(100-Yr.)				Helvetia 341			
Namobatang Dam	93	2.5 !	23,339		690	580	212
3. Percut River(100-Yr.)				Tembakau 171			
Lausimeme Dam	105	2.8	21,182		340	180	132
4. Serdang River(50-Yr.)				Baru 671			
Beranti Dam	159	3.3	38,800		850	690	243
Punden Retarding Basin	262	1.6	47,800		850	670	266
5. Ular River(50-Yr.)				Pulau Togor 1,013			
Buaya Dam	428	16.7	20,790		970	640	63
Karai Dam	500	19.5	21,600		970	590	57
6. Belutu River(50-Yr.)				Sei Rampah 423			
Sibakudu Dam	64	1.5	4,000		340	310	133
Bakaran Batu Retarding Basin	243	5.5	69,700		340	170	410
7. Padang River(50-Yr.)				Brohol 759			
Sampanan Dam	370	12.4	45,000		840	500	132
Tebing Tinggi Retarding Basin	414	5.0	91,000		840	590	364

Note : * : This value is defined from flood regulation analysis by applying max. 80% reduction of the standard Project Flood or possible storage capacity under its topographic or landuse condition.

Table 4-2 POPULATION PROJECTION , 1995-2010

Region	Population ('000) 1995			Annual Growth Rate (%) 1990-1995		
	C-1	C-2	C-3	C-1	C-2	C-3
Study A.	4,070	4,082	4,048	2.32	2.38	2.21
D+M	3,753	3,761	3,730	2.40	2.44	2.27
Deli S.	1,818	1,821	1,806	2.55	2.59	2.42
Medan	1,935	1,939	1,923	2.26	2.30	2.13
Tebing T.	130	132	131	2.19	2.40	2.23
Simal.	186	189	188	0.93	1.23	1.06

Region	2000			1995-2000		
	C-1	C-2	C-3	C-1	C-2	C-3
Study A.	4,556	4,591	4,471	2.28	2.38	2.01
D+M	4,218	4,242	4,131	2.37	2.44	2.07
Deli S.	2,058	2,069	2,016	2.52	2.59	2.22
Medan	2,160	2,172	2,116	2.22	2.30	1.93
Tebing T.	144	148	144	2.05	2.39	2.02
Simal.	193	201	196	0.73	1.22	0.85

Region	2005			2000-2005		
	C-1	C-2	C-3	C-1	C-2	C-3
Study A.	5,092	5,165	4,892	2.25	2.38	1.81
D+M	4,735	4,784	4,531	2.34	2.44	1.87
Deli S.	2,327	2,351	2,227	2.48	2.58	2.01
Medan	2,408	2,433	2,304	2.19	2.29	1.72
Tebing T.	159	167	158	1.91	2.39	1.82
Simal.	199	214	202	0.53	1.22	0.65

Region	2010			2005-2010		
	C-1	C-2	C-3	C-1	C-2	C-3
Study A.	5,681	5,811	5,300	2.21	2.38	1.62
D+M	5,306	5,396	4,922	2.31	2.44	1.67
Deli S.	2,626	2,671	2,436	2.45	2.58	1.81
Medan	2,680	2,725	2,485	2.16	2.29	1.52
Tebing T.	173	188	171	1.77	2.39	1.62
Simal.	202	227	207	0.33	1.22	0.45

Note : Study A. : Study Area
D+M : Kab. Deli Serdang and Kodya. Medan
Deli S. : Kab. Deli Serdang
Medan : Kodya. Medan
Tebing T. : Kodya. Tebing Tinggi
Simal. : Seven Kecamatans in Kab. Simalungun, Silima Kuta, Purba, Raya, Dolok Silau, Silau Kahean, Raya Kahean and Batu Nanggar.

C-1, C-2 and C-3 mean Cases 1, 2 and 3, respectively.

Table 4-3 ANNUAL DISBURSEMENT SCHEDULE FOR MASTER PLAN

(Unit : Million Rp)

Project	Quantity	Unit	Total	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1. Belawan River Improvement (50-Yr)	21.7	km	31,261										
2. Deli-Percut River System (100-Yr)			403,130			11,852	26,963	80,538	65,428	73,031	61,015	17,571	12,300
(a) Deli River Improvement	37.4	km	118,608			3,794	11,665	22,701	14,831	22,434	22,434	14,176	6,573
(b) Medan Floodway	3.8	km	32,035			1,058	2,730	8,315	6,644	6,644	6,644		
(c) Namobatang Multipurpose Dam	1	site	63,554									3,395	5,727
(d) Percut River Improvement	28.0	km	47,589			1,436	5,770	16,351	12,016	12,016			
(e) Lausimeme Multipurpose Dam	1	site	141,344			5,564	6,798	33,171	31,937	31,937	31,937		
3. Serdang River (50-Yr)			153,850										
(a) Serdang River Improvement	25.4	km	114,675										
(b) Belumai Aqueduct	5.5	km	39,175										
4. Ular River (50-Yr)/Karai Flood Control Dam	1	site	16,076										
5. Belutu River Improvement (50-Yr)	32.7	km	56,401										
6. Padang River Improvement (50-Yr)	29.5	km	100,544				3,455	10,338	12,393	12,393	12,393	12,393	12,393
Total			761,262			11,852	30,418	90,876	77,821	83,369	73,408	29,964	24,693

Project	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
1. Belawan River Improvement (50-Yr)						1,038	4,171	8,684	8,684	8,684
2. Deli-Percut River System (100-Yr)	13,608	13,608	13,608	13,608						
(a) Deli River Improvement										
(b) Medan Floodway										
(c) Namobatang Multipurpose Dam	13,608	13,608	13,608	13,608						
(d) Percut River Improvement										
(e) Lausimeme Multipurpose Dam										
3. Serdang River (50-Yr)	4,828	16,583	35,451	24,247	24,247	24,247	24,247			
(a) Serdang River Improvement	3,403	14,608	28,296	17,092	17,092	17,092	17,092			
(b) Belumai Aqueduct	1,425	1,975	7,155	7,155	7,155	7,155	7,155			
4. Ular River (50-Yr)/Karai Flood Control Dam						1,422	2,192	4,154	4,154	4,154
5. Belutu River Improvement (50-Yr)				1,727	11,299	8,675	8,675	8,675	8,675	8,675
6. Padang River Improvement (50-Yr)	12,393	12,393								
Total	30,829	42,584	49,059	39,582	35,546	35,382	39,285	21,513	21,513	21,513

Note : Project costs exclude price escalation.

Table 4-4(1/4) ANNUAL FLOW OF ECONOMIC COST AND BENEFIT FOR FLOOD CONTROL AND WATER SUPPLY

** Flood Control Project **

Unit : Million Rp

Year	1.1 Belawan River(10-Year) Economic Cost Const.	OMR	Total	Economic Benefit	1.2 Belawan River(20-Year) Economic Cost Const.	OMR	Total	Economic Benefit	1.3 Belawan River(30-Year) Economic Cost Const.	OMR	Total	Economic Benefit	1.4 Belawan River(50-Year) Economic Cost Const.	OMR	Total	Economic Benefit
1	642	0	642	0	805	0	805	0	911	0	911	0	1,017	0	1,017	0
2	1,473	0	1,473	0	2,355	0	2,355	0	2,933	0	2,933	0	3,523	0	3,523	0
3	5,230	0	5,230	0	6,553	0	6,553	0	7,418	0	7,418	0	8,282	0	8,282	0
4	5,230	42	5,272	108	6,553	53	6,606	237	7,418	60	7,478	290	8,282	67	8,349	334
5	5,230	85	5,315	216	6,553	106	6,659	475	7,418	119	7,537	579	8,282	133	8,415	667
6	0	127	127	324	0	159	159	712	0	179	179	869	0	200	200	1,001
7	0	127	127	324	0	159	159	712	0	179	179	869	0	200	200	1,001
8	0	127	127	324	0	159	159	712	0	179	179	869	0	200	200	1,001
9	0	127	127	324	0	159	159	712	0	179	179	869	0	200	200	1,001
10	0	127	127	324	0	159	159	712	0	179	179	869	0	200	200	1,001
11	0	127	127	324	0	159	159	712	0	179	179	869	0	200	200	1,001
12	0	127	127	324	0	159	159	712	0	179	179	869	0	200	200	1,001
13	0	127	127	324	0	159	159	712	0	179	179	869	0	200	200	1,001
14	0	127	127	324	0	159	159	712	0	179	179	869	0	200	200	1,001
15	0	127	127	324	0	159	159	712	0	179	179	869	0	200	200	1,001
16	0	127	127	324	0	159	159	712	0	179	179	869	0	200	200	1,001
17	0	127	127	324	0	159	159	712	0	179	179	869	0	200	200	1,001
18	0	127	127	324	0	159	159	712	0	179	179	869	0	200	200	1,001
19	0	127	127	324	0	159	159	712	0	179	179	869	0	200	200	1,001
20	0	127	127	324	0	159	159	712	0	179	179	869	0	200	200	1,001
21	0	127	127	324	0	159	159	712	0	179	179	869	0	200	200	1,001
22	0	127	127	324	0	159	159	712	0	179	179	869	0	200	200	1,001
23	0	127	127	324	0	159	159	712	0	179	179	869	0	200	200	1,001
24	0	127	127	324	0	159	159	712	0	179	179	869	0	200	200	1,001
25	0	127	127	324	0	159	159	712	0	179	179	869	0	200	200	1,001
26	0	127	127	324	0	159	159	712	0	179	179	869	0	200	200	1,001
27	0	127	127	324	0	159	159	712	0	179	179	869	0	200	200	1,001
28	0	127	127	324	0	159	159	712	0	179	179	869	0	200	200	1,001
29	0	127	127	324	0	159	159	712	0	179	179	869	0	200	200	1,001
30	0	127	127	324	0	159	159	712	0	179	179	869	0	200	200	1,001
31	0	127	127	324	0	159	159	712	0	179	179	869	0	200	200	1,001
32	0	127	127	324	0	159	159	712	0	179	179	869	0	200	200	1,001
33	0	127	127	324	0	159	159	712	0	179	179	869	0	200	200	1,001
34	0	127	127	324	0	159	159	712	0	179	179	869	0	200	200	1,001
35	0	127	127	324	0	159	159	712	0	179	179	869	0	200	200	1,001
36	0	127	127	324	0	159	159	712	0	179	179	869	0	200	200	1,001
37	0	127	127	324	0	159	159	712	0	179	179	869	0	200	200	1,001
38	0	127	127	324	0	159	159	712	0	179	179	869	0	200	200	1,001
39	0	127	127	324	0	159	159	712	0	179	179	869	0	200	200	1,001
40	0	127	127	324	0	159	159	712	0	179	179	869	0	200	200	1,001
41	0	127	127	324	0	159	159	712	0	179	179	869	0	200	200	1,001
42	0	127	127	324	0	159	159	712	0	179	179	869	0	200	200	1,001
43	0	127	127	324	0	159	159	712	0	179	179	869	0	200	200	1,001
44	0	127	127	324	0	159	159	712	0	179	179	869	0	200	200	1,001
45	0	127	127	324	0	159	159	712	0	179	179	869	0	200	200	1,001
46	0	127	127	324	0	159	159	712	0	179	179	869	0	200	200	1,001
47	0	127	127	324	0	159	159	712	0	179	179	869	0	200	200	1,001
48	0	127	127	324	0	159	159	712	0	179	179	869	0	200	200	1,001
49	0	127	127	324	0	159	159	712	0	179	179	869	0	200	200	1,001
50	0	127	127	324	0	159	159	712	0	179	179	869	0	200	200	1,001
51	0	127	127	324	0	159	159	712	0	179	179	869	0	200	200	1,001
52	0	127	127	324	0	159	159	712	0	179	179	869	0	200	200	1,001
53	0	127	127	324	0	159	159	712	0	179	179	869	0	200	200	1,001
54	0	127	127	324	0	159	159	712	0	179	179	869	0	200	200	1,001
55	0	127	127	324	0	159	159	712	0	179	179	869	0	200	200	1,001
56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
57	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
58	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
59	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
63	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
66	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
67	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	17,805	6,477	24,282	16,524	22,819	8,109	30,928	36,312	26,098	9,129	35,227	44,319	29,386	10,200	39,586	51,051

Year	2.1 Deli-Percut River System(10-Year) Economic Cost Const.	OMR	Total	Economic Benefit	2.2 Deli-Percut River System(20-Year) Economic Cost Const.	OMR	Total	Economic Benefit	2.3 Deli-Percut River System(30-Year) Economic Cost Const.	OMR	Total	Economic Benefit	2.3 Deli-Percut River System(50-Year) Economic Cost Const.	OMR	Total	Economic Benefit	2.5 Deli-Percut River System(100-Year) Economic Cost Const.	OMR	Total	Economic Benefit
1	5,128	0	5,128	0	6,241	0	6,241	0	8,064	0	8,064	0	8,527	0	8,527	0	8,448	0	8,448	0
2	14,279	0	14,279	0	17,664	0	17,664	0	19,020	0	19,020	0	20,047	0	20,047	0	19,673	0	19,673	0
3	31,069	0	31,069	0	43,082	0	43,082	0	44,031	0	44,031	0	47,356	0	47,356	0	45,980	0	45,980	0
4	21,919	233	22,152	8,137	31,659	322	31,981	10,304	33,075	327	33,402	10,443	35,835	352	36,187	10,943	34,755	330	35,085	9,897
5	29,057	397	29,454	13,878	38,798	559	39,357	17,876	40,212	573	40,785	18,288	42,974	619	43,593	19,223	41,892	579	42,471	17,378
6	21,332	615	21,947	19,466	27,158	849	28,007	24,371	30,664	872	31,536	25,560	31,591	938	32,529	26,523	31,057	879	31,936	26,396
7	18,327	775	19,102	27,076	14,223	1,053	15,276	33,650	14,357	1,100	15,457	35,097	14,402	1,173	15,575	36,453	16,628	1,101	17,729	33,081
8	11,190	912	12,102	31,876	7,084	1,159	8,243	37,052	7,220	1,206	8,426	38,503	7,264	1,280	8,544	39,781	10,686	1,220	11,906	36,660
9	0	996	996	34,807	0	1,212	1,212	38,746	0	1,260	1,260	40,215	0	1,334	1,334	41,459	4,044	1,297	5,341	38,960
10	0	996	996	34,807	0	1,212	1,212	38,746	0	1,260	1,260	40,215	0	1,334	1,334	41,459	4,044	1,326	5,370	39,831
11	0	996	996	34,807	0	1,212	1,212	38,746	0	1,260	1,260	40,215	0	1,334	1,334	41,459	4,044	1,355	5,399	40,701
12	0	996	996	34,807	0	1,212	1,212	38,746	0	1,260	1,260	40,215	0	1,334	1,334	41,459	4,044	1,384	5,428	41,572
13	0	996	996	34,807	0	1,212	1,212	38,746	0	1,260	1,260	40,215	0	1,334	1,334	41,459	0	1,413	1,413	42,442
14	0	996	996	34,807	0	1,212	1,212	38,746	0	1,260	1,260	40,215	0	1,334	1,334	41,459	0	1,413	1,413	42,442
15	0	996	996	34,807	0	1,212	1,212	38,746	0	1,260	1,260	40,215	0	1,334	1,334	41,459	0	1,413	1,413	42,442
16	0	996	996	34,807	0	1,212	1,212	38,746	0	1,260	1,260	40,215	0	1,334	1,334	41,459	0	1,413	1,413	42,442
17	0	996	996	34,807	0	1,212	1,212	38,746	0	1,260	1,260	40,215	0	1,334	1,334	41,459	0	1,413	1,413	42,442
18	0	996	996	34,807	0	1,212	1,212	38,746	0	1,260	1,260	40,215	0	1,334	1,334	41,459	0	1,413	1,413	42,442
19	0	996	996	34,807	0	1,212	1,212	38,746	0	1,260	1,260	40,215	0	1,334	1,334	41,459	0	1,413	1,413	42,442
20	0	996	996	34,807	0	1,212	1,212	38,746	0	1,260	1,260	40,215	0	1,334	1,334	41,459	0	1,413	1,413	42,442
21	0	996	996	34,807	0	1,212	1,212	38,746	0	1,260	1,260	40,215	0	1,334	1,334	41,459	0	1,413	1,413	42,442
22	0	996	996	34,807	0	1,212	1,212	38,746	0	1,260	1,260	40,215	0	1,334	1,334	41,459	0	1,413	1,413	42,442
23	0	996	996	34,807	0	1,212	1,212	38,746	0	1,260	1,260	40,215	0	1,334	1,334	41,459	0	1,413	1,413	42,442
24	0	996	996	34,807	0	1,212	1,212	38,746	0	1,260	1,260	40,215	0	1,334	1,334	41,459	0	1,413	1,413	42,442
25	0	996	996	34,807	0	1,212	1,212	38,746	0	1,260	1,260	40,215	0	1,334	1,334	41,459	0	1,413	1,413	42,442
26	0	996	996	34,807	0	1,212	1,212	38,746	0	1,260	1,260	40,215	0	1,334	1,334	41,459	0	1,413	1,413	42,442
27	0	996	996	34,807	0	1,212	1,212	38,746	0	1,260	1,260	40,215	0	1,334	1,334	41,459	0	1,413	1,413	42,442
28	0	996	996	34,807	0	1,212	1,212	38,746	0	1,260	1,260	40,215	0	1,334	1,334	41,459	0	1,413	1,413	42,442
29	0	996	996	34,807	0	1,212	1,212	38,746	0	1,260	1,260	40,215	0	1,334	1,334	41,459	0	1,413	1,413	42,442
30	0	996	996	34,807	0	1,212	1,212	38,746	0	1,260	1,260	40,215	0	1,334	1,334	41,459	0	1,413	1,413	42,442
31	0	996	996	34,807	0	1,212	1,212	38,746	0	1,260	1,260	40,215	0	1,334	1,334	41,459	0	1,413	1,413	42,442
32	0	996	996	34,807	0	1,212	1,212	38,746	0	1,260	1,260	40,215	0	1,334	1,334	41,459	0	1,413	1,413	42,442
33	0	996	996	34,807	0	1,212	1,212	38,746	0	1,260	1,260	40,215	0	1,334	1,334	41,459	0	1,413	1,413	42,442
34	0	996	996	34,807	0	1,212	1,212	38,746	0	1,260	1,260	40,215	0	1,334	1,334	41,459	0	1,413	1,413	42,442
35	0	996	996	34,807	0	1,212	1,212	38,746	0	1,260	1,260	40,215	0	1,334	1,334	41,459	0	1,413	1,413	42,442
36	0	996	996	34,807	0	1,212	1,212	38,746	0	1,260	1,260	40,215	0	1,334	1,334	41,459	0	1,413	1,413	42,442
37	0	996	996	34,807	0	1,212	1,212	38,746	0	1,260	1,260	40,215	0	1,334	1,334	41,459	0	1,413	1,413	42,442
38	0	996	996	34,807	0	1,212	1,212	38,746	0	1,260	1,260	40,215	0	1,334	1,334	41,459	0	1,413	1,413	42,442
39	0	996	996	34,807	0	1,212	1,212	38,746	0	1,260	1,260	40,215	0	1,334	1,334	41,459	0	1,413	1,413	42,442
40	0	996	996	34,807	0	1,212	1,212	38,746	0	1,260	1,260	40,215	0	1,334	1,334	41,459	0	1,413	1,413	42,442
41	0	996	996	34,807	0	1,212	1,212	38,746	0	1,260	1,260	40,215	0	1,334	1,334	41,459	0	1,413	1,413	42,442
42	0	996	996	34,807	0	1,212	1,212	38,746	0	1,260	1,260	40,215	0	1,334	1,334	41,459	0	1,413	1,413	42,442
43	0	996	996	34,807	0	1,212	1,212	38,746	0	1,260	1,260	40,215	0	1,334	1,334	41,459	0	1,413	1,413	42,442
44	0	996	996	34,807	0	1,212	1,212	38,746	0	1,260	1,260	40,215	0	1,334	1,334	41,459	0	1,413	1,413	42,442
45	0	996	996	34,807	0	1,212	1,212	38,746	0	1,260	1,260	40,215	0	1,334	1,334	41,459	0	1,413	1,413	42,442
46	0	996	996	34,807	0	1,212	1,212	38,746	0	1,260	1,260	40,215	0	1,334	1,334	41,459	0	1,413	1,413	42,442
47	0	996	996	34,807	0	1,212	1,212	38,746	0	1,260	1,260	40,215	0	1,334	1,334	41,459	0	1,413	1,413	42,442
48	0	996	996	34,807	0	1,212	1,212	38,746	0	1,260	1,260	40,215	0	1,334	1,334	41,459	0	1,413	1,413	42,442
49	0	996	996	34,807	0	1,212	1,212	38,746	0	1,260	1,260	40,215	0	1,334	1,334	41,459	0	1,413	1,413	42,442
50	0	996	996	34,807	0	1,212	1,212	38,746	0	1,260	1,260	40,215	0	1,334	1,334	41,459	0	1,413	1,413	42,442
51	0	996	996	34,807	0	1,212	1,212	38,746	0	1,260	1,260	40,215	0	1,334	1,334	41,459	0	1,413	1,413	42,442
52	0	996	996	34,807	0	1,212	1,212	38,746	0	1,260	1,260	40,215	0	1,334	1,334	41,459	0	1,413	1,413	42,442
53	0	996	996	34,807	0	1,212	1,212	38,746	0	1,260	1,260	40,215	0	1,334	1,334	41,459	0	1,413	1,413	42,442
54	0	996	996	34,807	0	1,212	1,212	38,746	0	1,260	1,260	40,215	0	1,334	1,334	41,459	0	1,413	1,413	42,442
55	0	996	996	34,807	0	1,212	1,212	38,746	0	1,260	1,260	40,215	0	1,334	1,334	41,459	0	1,413	1,413	42,442
56	0	996	996	34,807	0	1,212	1,212	38,746	0	1,260	1,260	40,215	0	1,334	1,334	41,459	0	1,413	1,413	42,442
57	0	996	996	34,807	0	1,212	1,212	38,746	0	1,260	1,260	40,215	0	1,334	1,334	41,459	0	1,413	1,413	42,442
58	0	996	996	34,807	0	1,212	1,212	38,746	0	1,260	1,260	40,215	0	1,334	1,334	41,459	0	1,413	1,413	42,442
59	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,413	1,413	42,442
60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,413	1,413	42,442
61	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,413	1,413	42,442
62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,413	1,413	42,442
63	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
66	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
67	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	152,301	52,732	205,033	1,840,784	185,909	64,542	250,451	2,060,552	196,643	67,078	263,721	2,138,641	207,996	71,062	279,058	2,205,871	225,295	80,121	305,416	2,406,575

Table 4-4(2/4) ANNUAL FLOW OF ECONOMIC COST AND BENEFIT FOR FLOOD CONTROL AND WATER SUPPLY

** Flood Control Project **

Unit : Million Rp

Year	3.1 Serdang River(10-Year) Economic Cost Const.	OMR	Total	Economic Benefit	3.2 Serdang River(20-Year) Economic Cost Const.	OMR	Total	Economic Benefit	3.3 Serdang River(30-Year) Economic Cost Const.	OMR	Total	Economic Benefit	3.4 Serdang River(50-Year) Economic Cost Const.	OMR	Total	Economic Benefit
1	2,711	0	2,711	0	2,954	0	2,954	0	3,128	0	3,128	0	3,336	0	3,336	0
2	11,347	0	11,347	0	11,669	0	11,669	0	11,931	0	11,931	0	12,299	0	12,299	0
3	21,892	0	21,892	0	23,154	0	23,154	0	24,100	0	24,100	0	25,270	0	25,270	0
4	13,256	156	13,412	3,191	14,439	167	14,606	3,408	15,298	174	15,472	3,461	16,306	183	16,489	3,498
5	13,256	251	13,507	5,123	14,439	270	14,709	5,533	15,298	285	15,583	5,658	16,306	302	16,608	5,755
6	13,256	345	13,601	7,055	14,439	374	14,813	7,658	15,298	396	15,694	7,854	16,306	420	16,726	8,013
7	13,256	440	13,696	8,987	14,439	478	14,917	9,784	15,298	506	15,804	10,051	16,306	539	16,845	10,270
8	0	534	534	10,919	0	582	582	11,909	0	617	617	12,248	0	657	657	12,527
9	0	534	534	10,919	0	582	582	11,909	0	617	617	12,248	0	657	657	12,527
10	0	534	534	10,919	0	582	582	11,909	0	617	617	12,248	0	657	657	12,527
11	0	534	534	10,919	0	582	582	11,909	0	617	617	12,248	0	657	657	12,527
12	0	534	534	10,919	0	582	582	11,909	0	617	617	12,248	0	657	657	12,527
13	0	534	534	10,919	0	582	582	11,909	0	617	617	12,248	0	657	657	12,527
14	0	534	534	10,919	0	582	582	11,909	0	617	617	12,248	0	657	657	12,527
15	0	534	534	10,919	0	582	582	11,909	0	617	617	12,248	0	657	657	12,527
16	0	534	534	10,919	0	582	582	11,909	0	617	617	12,248	0	657	657	12,527
17	0	534	534	10,919	0	582	582	11,909	0	617	617	12,248	0	657	657	12,527
18	0	534	534	10,919	0	582	582	11,909	0	617	617	12,248	0	657	657	12,527
19	0	534	534	10,919	0	582	582	11,909	0	617	617	12,248	0	657	657	12,527
20	0	534	534	10,919	0	582	582	11,909	0	617	617	12,248	0	657	657	12,527
21	0	534	534	10,919	0	582	582	11,909	0	617	617	12,248	0	657	657	12,527
22	0	534	534	10,919	0	582	582	11,909	0	617	617	12,248	0	657	657	12,527
23	0	534	534	10,919	0	582	582	11,909	0	617	617	12,248	0	657	657	12,527
24	0	534	534	10,919	0	582	582	11,909	0	617	617	12,248	0	657	657	12,527
25	0	534	534	10,919	0	582	582	11,909	0	617	617	12,248	0	657	657	12,527
26	0	534	534	10,919	0	582	582	11,909	0	617	617	12,248	0	657	657	12,527
27	0	534	534	10,919	0	582	582	11,909	0	617	617	12,248	0	657	657	12,527
28	0	534	534	10,919	0	582	582	11,909	0	617	617	12,248	0	657	657	12,527
29	0	534	534	10,919	0	582	582	11,909	0	617	617	12,248	0	657	657	12,527
30	0	534	534	10,919	0	582	582	11,909	0	617	617	12,248	0	657	657	12,527
31	0	534	534	10,919	0	582	582	11,909	0	617	617	12,248	0	657	657	12,527
32	0	534	534	10,919	0	582	582	11,909	0	617	617	12,248	0	657	657	12,527
33	0	534	534	10,919	0	582	582	11,909	0	617	617	12,248	0	657	657	12,527
34	0	534	534	10,919	0	582	582	11,909	0	617	617	12,248	0	657	657	12,527
35	0	534	534	10,919	0	582	582	11,909	0	617	617	12,248	0	657	657	12,527
36	0	534	534	10,919	0	582	582	11,909	0	617	617	12,248	0	657	657	12,527
37	0	534	534	10,919	0	582	582	11,909	0	617	617	12,248	0	657	657	12,527
38	0	534	534	10,919	0	582	582	11,909	0	617	617	12,248	0	657	657	12,527
39	0	534	534	10,919	0	582	582	11,909	0	617	617	12,248	0	657	657	12,527
40	0	534	534	10,919	0	582	582	11,909	0	617	617	12,248	0	657	657	12,527
41	0	534	534	10,919	0	582	582	11,909	0	617	617	12,248	0	657	657	12,527
42	0	534	534	10,919	0	582	582	11,909	0	617	617	12,248	0	657	657	12,527
43	0	534	534	10,919	0	582	582	11,909	0	617	617	12,248	0	657	657	12,527
44	0	534	534	10,919	0	582	582	11,909	0	617	617	12,248	0	657	657	12,527
45	0	534	534	10,919	0	582	582	11,909	0	617	617	12,248	0	657	657	12,527
46	0	534	534	10,919	0	582	582	11,909	0	617	617	12,248	0	657	657	12,527
47	0	534	534	10,919	0	582	582	11,909	0	617	617	12,248	0	657	657	12,527
48	0	534	534	10,919	0	582	582	11,909	0	617	617	12,248	0	657	657	12,527
49	0	534	534	10,919	0	582	582	11,909	0	617	617	12,248	0	657	657	12,527
50	0	534	534	10,919	0	582	582	11,909	0	617	617	12,248	0	657	657	12,527
51	0	534	534	10,919	0	582	582	11,909	0	617	617	12,248	0	657	657	12,527
52	0	534	534	10,919	0	582	582	11,909	0	617	617	12,248	0	657	657	12,527
53	0	534	534	10,919	0	582	582	11,909	0	617	617	12,248	0	657	657	12,527
54	0	534	534	10,919	0	582	582	11,909	0	617	617	12,248	0	657	657	12,527
55	0	534	534	10,919	0	582	582	11,909	0	617	617	12,248	0	657	657	12,527
56	0	534	534	10,919	0	582	582	11,909	0	617	617	12,248	0	657	657	12,527
57	0	534	534	10,919	0	582	582	11,909	0	617	617	12,248	0	657	657	12,527
58	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
59	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
63	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
66	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
67	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	88,974	27,891	116,865	570,305	95,533	30,389	125,922	621,833	100,351	32,211	132,562	639,424	106,129	34,294	140,423	653,886

Year	4.1 Ular River(20-Year) Economic Cost Const.	OMR	Total	Economic Benefit	4.2 Ular River(30-Year) Economic Cost Const.	OMR	Total	Economic Benefit	4.3 Ular River(50-Year) Economic Cost Const.	OMR	Total	Economic Benefit	Year
1	178	0	178	0	1,306	0	1,306	0	1,393	0	1,393	0	1
2	178	0	178	0	1,883	0	1,883	0	2,009	0	2,009	0	2
3	1,444	0	1,444	0	3,663	0	3,663	0	3,907	0	3,907	0	3
4	1,444	12	1,456	153	3,663	26	3,689	360	3,907	28	3,935	507	4
5	1,444	23	1,467	307	3,663	53	3,716	720	3,907	56	3,963	1,013	5
6	0	35	35	460	0	79	79	1,080	0	84	84	1,520	6
7	0	35	35	460	0	79	79	1,080	0	84	84	1,520	7
8	0	35	35	460	0	79	79	1,080	0	84	84	1,520	8
9	0	35	35	460	0	79	79	1,080	0	84	84	1,520	9
10	0	35	35	460	0	79	79	1,080	0	84	84	1,520	10
11	0	35	35	460	0	79	79	1,080	0	84	84	1,520	11
12	0	35	35	460	0	79	79	1,080	0	84	84	1,520	12
13	0	35	35	460	0	79	79	1,080	0	84	84	1,520	13
14	0	35	35	460	0	79	79	1,080	0	84	84	1,520	14
15	0	35	35	460	0	79	79	1,080	0	84	84	1,520	15
16	0	35	35	460	0	79	79	1,080	0	84	84	1,520	16
17	0	35	35	460	0	79	79	1,080	0	84	84	1,520	17
18	0	35	35	460	0	79	79	1,080	0	84	84	1,520	18
19	0	35	35	460	0	79	79	1,080	0	84	84	1,520	19
20	0	35	35	460	0	79	79	1,080	0	84	84	1,520	20
21	0	35	35	460	0	79	79	1,080	0	84	84	1,520	21
22	0	35	35	460	0	79	79	1,080	0	84	84	1,520	22
23	0	35	35	460	0	79	79	1,080	0	84	84	1,520	23
24	0	35	35	460	0	79	79	1,080	0	84	84	1,520	24
25	0	35	35	460	0	79	79	1,080	0	84	84	1,520	25
26	0	35	35	460	0	79	79	1,080	0	84	84	1,520	26
27	0	35	35	460	0	79	79	1,080	0	84	84	1,520	27
28	0	35	35	460	0	79	79	1,080	0	84	84	1,520	28
29	0	35	35	460	0	79	79	1,080	0	84	84	1,520	29
30	0	35	35	460	0	79	79	1,080	0	84	84	1,520	30
31	0	35	35	460	0	79	79	1,080	0	84	84	1,520	31
32	0	35	35	460	0	79	79	1,080	0	84	84	1,520	32
33	0	35	35	460	0	79	79	1,080	0	84	84	1,520	33
34	0	35	35	460	0	79	79	1,080	0	84	84	1,520	34
35	0	35	35	460	0	79	79	1,080	0	84	84	1,520	35
36	0	35	35	460	0	79	79	1,080	0	84	84	1,520	36
37	0	35	35	460	0	79	79	1,080	0	84	84	1,520	37
38	0	35	35	460	0	79	79	1,080	0	84	84	1,520	38
39	0	35	35	460	0	79	79	1,080	0	84	84	1,520	39
40	0	35	35	460	0	79	79	1,080	0	84	84	1,520	40
41	0	35	35	460	0	79	79	1,080	0	84	84	1,520	41
42	0	35	35	460	0	79	79	1,080	0	84	84	1,520	42
43	0	35	35	460	0	79	79	1,080	0	84	84	1,520	43
44	0	35	35	460	0	79	79	1,080	0	84	84	1,520	44
45	0	35	35	460	0	79	79	1,080	0	84	84	1,520	45
46	0	35	35	460	0	79	79	1,080	0	84	84	1,520	46
47	0	35	35	460	0	79	79	1,080	0	84	84	1,520	47
48	0	35	35	460	0	79	79	1,080	0	84	84	1,520	48
49	0	35	35	460	0	79	79	1,080	0	84	84	1,520	49
50	0	35	35	460	0	79	79	1,080	0	84	84	1,520	50
51	0	35	35	460	0	79	79	1,080	0	84	84	1,520	51
52	0	35	35	460	0	79	79	1,080	0	84	84	1,520	52
53	0	35	35	460	0	79	79	1,080	0	84	84	1,520	53
54	0	35	35	460	0	79	79	1,080	0	84	84	1,520	54
55	0	35	35	460	0	79	79	1,080	0	84	84	1,520	55
56	0	0	0	0	0	0	0	0	0	0	0	0	56
57	0	0	0	0	0	0	0	0	0	0	0	0	57
58	0	0	0	0	0	0	0	0	0	0	0	0	58
59	0	0	0	0	0	0	0	0	0	0	0	0	59
60	0	0	0	0	0	0	0	0	0	0	0	0	60
61	0	0	0	0	0	0	0	0	0	0	0	0	61
62	0	0	0	0	0	0	0	0	0	0	0	0	62
63	0	0	0	0	0	0	0	0	0	0	0	0	63
64	0	0	0	0	0	0	0	0	0	0	0	0	64
65	0	0	0	0	0	0	0	0	0	0	0	0	65
66	0	0	0	0	0	0	0	0	0	0	0	0	66
67	0	0	0	0	0	0	0	0	0	0	0	0	67
Total	4,688	1,785	6,473	23,460	14,178	4,029	18,207	55,080	15,123	4,284	19,407	77,520	Total

Table 4-4(3/4) ANNUAL FLOW OF ECONOMIC COST AND BENEFIT FOR FLOOD CONTROL AND WATER SUPPLY

** Flood Control Project **

Unit : Million Rp

Year	5.1 Belutu River(10-Year) Economic Cost Const.	OMR	Total	Economic Benefit	5.2 Belutu River(20-Year) Economic Cost Const.	OMR	Total	Economic Benefit	5.3 Belutu River(30-Year) Economic Cost Const.	OMR	Total	Economic Benefit	5.4 Belutu River(50-Year) Economic Cost Const.	OMR	Total	Economic Benefit
1	1,415	0	1,415	0	1,519	0	1,519	0	1,588	0	1,588	0	1,693	0	1,693	0
2	9,070	0	9,070	0	9,174	0	9,174	0	9,243	0	9,243	0	9,348	0	9,348	0
3	6,912	0	6,912	0	7,415	0	7,415	0	7,751	0	7,751	0	8,267	0	8,267	0
4	6,912	56	6,968	404	7,415	60	7,475	443	7,751	62	7,813	458	8,267	67	8,334	471
5	6,912	112	7,024	808	7,415	120	7,535	887	7,751	125	7,876	917	8,267	133	8,400	942
6	6,912	167	7,079	1,211	7,415	179	7,594	1,330	7,751	187	7,938	1,375	8,267	200	8,467	1,412
7	6,912	223	7,135	1,615	7,415	239	7,654	1,774	7,751	250	8,001	1,834	8,267	266	8,533	1,883
8	0	279	279	2,019	0	299	299	2,217	0	312	312	2,292	0	333	333	2,354
9	0	279	279	2,019	0	299	299	2,217	0	312	312	2,292	0	333	333	2,354
10	0	279	279	2,019	0	299	299	2,217	0	312	312	2,292	0	333	333	2,354
11	0	279	279	2,019	0	299	299	2,217	0	312	312	2,292	0	333	333	2,354
12	0	279	279	2,019	0	299	299	2,217	0	312	312	2,292	0	333	333	2,354
13	0	279	279	2,019	0	299	299	2,217	0	312	312	2,292	0	333	333	2,354
14	0	279	279	2,019	0	299	299	2,217	0	312	312	2,292	0	333	333	2,354
15	0	279	279	2,019	0	299	299	2,217	0	312	312	2,292	0	333	333	2,354
16	0	279	279	2,019	0	299	299	2,217	0	312	312	2,292	0	333	333	2,354
17	0	279	279	2,019	0	299	299	2,217	0	312	312	2,292	0	333	333	2,354
18	0	279	279	2,019	0	299	299	2,217	0	312	312	2,292	0	333	333	2,354
19	0	279	279	2,019	0	299	299	2,217	0	312	312	2,292	0	333	333	2,354
20	0	279	279	2,019	0	299	299	2,217	0	312	312	2,292	0	333	333	2,354
21	0	279	279	2,019	0	299	299	2,217	0	312	312	2,292	0	333	333	2,354
22	0	279	279	2,019	0	299	299	2,217	0	312	312	2,292	0	333	333	2,354
23	0	279	279	2,019	0	299	299	2,217	0	312	312	2,292	0	333	333	2,354
24	0	279	279	2,019	0	299	299	2,217	0	312	312	2,292	0	333	333	2,354
25	0	279	279	2,019	0	299	299	2,217	0	312	312	2,292	0	333	333	2,354
26	0	279	279	2,019	0	299	299	2,217	0	312	312	2,292	0	333	333	2,354
27	0	279	279	2,019	0	299	299	2,217	0	312	312	2,292	0	333	333	2,354
28	0	279	279	2,019	0	299	299	2,217	0	312	312	2,292	0	333	333	2,354
29	0	279	279	2,019	0	299	299	2,217	0	312	312	2,292	0	333	333	2,354
30	0	279	279	2,019	0	299	299	2,217	0	312	312	2,292	0	333	333	2,354
31	0	279	279	2,019	0	299	299	2,217	0	312	312	2,292	0	333	333	2,354
32	0	279	279	2,019	0	299	299	2,217	0	312	312	2,292	0	333	333	2,354
33	0	279	279	2,019	0	299	299	2,217	0	312	312	2,292	0	333	333	2,354
34	0	279	279	2,019	0	299	299	2,217	0	312	312	2,292	0	333	333	2,354
35	0	279	279	2,019	0	299	299	2,217	0	312	312	2,292	0	333	333	2,354
36	0	279	279	2,019	0	299	299	2,217	0	312	312	2,292	0	333	333	2,354
37	0	279	279	2,019	0	299	299	2,217	0	312	312	2,292	0	333	333	2,354
38	0	279	279	2,019	0	299	299	2,217	0	312	312	2,292	0	333	333	2,354
39	0	279	279	2,019	0	299	299	2,217	0	312	312	2,292	0	333	333	2,354
40	0	279	279	2,019	0	299	299	2,217	0	312	312	2,292	0	333	333	2,354
41	0	279	279	2,019	0	299	299	2,217	0	312	312	2,292	0	333	333	2,354
42	0	279	279	2,019	0	299	299	2,217	0	312	312	2,292	0	333	333	2,354
43	0	279	279	2,019	0	299	299	2,217	0	312	312	2,292	0	333	333	2,354
44	0	279	279	2,019	0	299	299	2,217	0	312	312	2,292	0	333	333	2,354
45	0	279	279	2,019	0	299	299	2,217	0	312	312	2,292	0	333	333	2,354
46	0	279	279	2,019	0	299	299	2,217	0	312	312	2,292	0	333	333	2,354
47	0	279	279	2,019	0	299	299	2,217	0	312	312	2,292	0	333	333	2,354
48	0	279	279	2,019	0	299	299	2,217	0	312	312	2,292	0	333	333	2,354
49	0	279	279	2,019	0	299	299	2,217	0	312	312	2,292	0	333	333	2,354
50	0	279	279	2,019	0	299	299	2,217	0	312	312	2,292	0	333	333	2,354
51	0	279	279	2,019	0	299	299	2,217	0	312	312	2,292	0	333	333	2,354
52	0	279	279	2,019	0	299	299	2,217	0	312	312	2,292	0	333	333	2,354
53	0	279	279	2,019	0	299	299	2,217	0	312	312	2,292	0	333	333	2,354
54	0	279	279	2,019	0	299	299	2,217	0	312	312	2,292	0	333	333	2,354
55	0	279	279	2,019	0	299	299	2,217	0	312	312	2,292	0	333	333	2,354
56	0	279	279	2,019	0	299	299	2,217	0	312	312	2,292	0	333	333	2,354
57	0	279	279	2,019	0	299	299	2,217	0	312	312	2,292	0	333	333	2,354
58	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
59	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
63	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
66	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
67	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	45,045	14,508	59,553	104,988	47,768	15,548	63,316	115,284	49,586	16,224	65,810	119,184	52,376	17,316	69,692	122,408

Year	6.1 Padang River(10-Year) Economic Cost Const.	OMR	Total	Economic Benefit	6.2 Padang River(20-Year) Economic Cost Const.	OMR	Total	Economic Benefit	6.3 Padang River(30-Year) Economic Cost Const.	OMR	Total	Economic Benefit	6.4 Padang River(50-Year) Economic Cost Const.	OMR	Total	Economic Benefit	Year
1	2,409	0	2,409	0	2,840	0	2,840	0	3,082	0	3,082	0	3,386	0	3,386	0	1
2	7,915	0	7,915	0	8,346	0	8,346	0	8,588	0	8,588	0	8,892	0	8,892	0	2
3	11,751	0	11,751	0	11,549	0	11,549	0	12,540	0	12,540	0	11,808	0	11,808	0	3
4	11,751	95	11,846	1,792	11,549	93	11,642	1,643	12,540	101	12,641	1,699	11,808	95	11,903	1,496	4
5	11,751	190	11,941	3,584	11,549	186	11,735	3,286	12,540	202	12,742	3,398	11,808	190	11,998	2,991	5
6	11,751	284	12,035	5,377	11,549	280	11,829	4,929	12,540	304	12,844	5,097	11,808	285	12,093	4,487	6
7	11,751	379	12,130	7,169	11,549	373	11,922	6,571	12,540	405	12,945	6,795	11,808	381	12,189	5,982	7
8	0	474	474	8,961	11,549	466	12,015	8,214	12,540	506	13,046	8,494	11,808	476	12,284	7,478	8
9	0	474	474	8,961	0	559	559	9,857	0	607	607	10,193	11,808	571	12,379	8,973	9
10	0	474	474	8,961	0	559	559	9,857	0	607	607	10,193	0	666	666	10,469	10
11	0	474	474	8,961	0	559	559	9,857	0	607	607	10,193	0	666	666	10,469	11
12	0	474	474	8,961	0	559	559	9,857	0	607	607	10,193	0	666	666	10,469	12
13	0	474	474	8,961	0	559	559	9,857	0	607	607	10,193	0	666	666	10,469	13
14	0	474	474	8,961	0	559	559	9,857	0	607	607	10,193	0	666	666	10,469	14
15	0	474	474	8,961	0	559	559	9,857	0	607	607	10,193	0	666	666	10,469	15
16	0	474	474	8,961	0	559	559	9,857	0	607	607	10,193	0	666	666	10,469	16
17	0	474	474	8,961	0	559	559	9,857	0	607	607	10,193	0	666	666	10,469	17
18	0	474	474	8,961	0	559	559	9,857	0	607	607	10,193	0	666	666	10,469	18
19	0	474	474	8,961	0	559	559	9,857	0	607	607	10,193	0	666	666	10,469	19
20	0	474	474	8,961	0	559	559	9,857	0	607	607	10,193	0	666	666	10,469	20
21	0	474	474	8,961	0	559	559	9,857	0	607	607	10,193	0	666	666	10,469	21
22	0	474	474	8,961	0	559	559	9,857	0	607	607	10,193	0	666	666	10,469	22
23	0	474	474	8,961	0	559	559	9,857	0	607	607	10,193	0	666	666	10,469	23
24	0	474	474	8,961	0	559	559	9,857	0	607	607	10,193	0	666	666	10,469	24
25	0	474	474	8,961	0	559	559	9,857	0	607	607	10,193	0	666	666	10,469	25
26	0	474	474	8,961	0	559	559	9,857	0	607	607	10,193	0	666	666	10,469	26
27	0	474	474	8,961	0	559	559	9,857	0	607	607	10,193	0	666	666	10,469	27
28	0	474	474	8,961	0	559	559	9,857	0	607	607	10,193	0	666	666	10,469	28
29	0	474	474	8,961	0	559	559	9,857	0	607	607	10,193	0	666	666	10,469	29
30	0	474	474	8,961	0	559	559	9,857	0	607	607	10,193	0	666	666	10,469	30
31	0	474	474	8,961	0	559	559	9,857	0	607	607	10,193	0	666	666	10,469	31
32	0	474	474	8,961	0	559	559	9,857	0	607	607	10,193	0	666	666	10,469	32
33	0	474	474	8,961	0	559	559	9,857	0	607	607	10,193	0	666	666	10,469	33
34	0	474	474	8,961	0	559	559	9,857	0	607	607	10,193	0	666	666	10,469	34
35	0	474	474	8,961	0	559	559	9,857	0	607	607	10,193	0	666	666	10,469	35
36	0	474	474	8,961	0	559	559	9,857	0	607	607	10,193	0	666	666	10,469	36
37	0	474	474	8,961	0	559	559	9,857	0	607	607	10,193	0	666	666	10,469	37
38	0	474	474	8,961	0	559	559	9,857	0	607	607	10,193	0	666	666	10,469	38
39	0	474	474	8,961	0	559	559	9,857	0	607	607	10,193	0	666	666	10,469	39
40	0	474	474	8,961	0	559	559	9,857	0	607	607	10,193	0	666	666	10,469	40
41	0	474	474	8,961	0	559	559	9,857	0	607	607	10,193	0	666	666	10,469	41
42	0	474	474	8,961	0	559	559	9,857	0	607	607	10,193	0	666	666	10,469	42
43	0	474	474	8,961	0	559	559	9,857	0	607	607	10,193	0	666	666	10,469	43
44	0	474	474	8,961	0	559	559	9,857	0	607	607	10,193	0	666	666	10,469	44
45	0	474	474	8,961	0	559	559	9,857	0	607	607	10,193	0	666	666	10,469	45
46	0	474	474	8,961	0	559	559	9,857	0	607	607	10,193	0	666	666	10,469	46
47	0	474	474	8,961	0	559	559	9,857	0	607	607	10,193	0	666	666	10,469	47
48	0	474	474	8,961	0	559	559	9,857	0	607	607	10,193	0	666	666	10,469	48
49	0	474	474	8,961	0	559	559	9,857	0	607	607	10,193	0	666	666	10,469	49
50	0	474	474	8,961	0	559	559	9,857	0	607	607	10,193	0	666	666	10,469	50
51	0	474	474	8,961	0	559	559	9,857	0	607	607	10,193	0	666	666	10,469	51
52	0	474	474	8,961	0	559	559	9,857	0	607	607	10,193	0	666	666	10,469	52
53	0	474	474	8,961	0	559	559	9,857	0	607	607	10,193	0	666	666	10,469	53
54	0	474	474	8,961	0	559	559	9,857	0	607	607	10,193	0	666	666	10,469	54
55	0	474	474	8,961	0	559	559	9,857	0	607	607	10,193	0	666	666	10,469	55
56	0	474	474	8,961	0	559	559	9,857	0	607	607	10,193	0	666	666	10,469	56
57	0	474	474	8,961	0	559	559	9,857	0	607	607	10,193	0	666	666	10,469	57
58	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	58
59	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	59
60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	60
61	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	61
62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	62
63	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	63
64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	64
65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	65
66	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	66
67	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	67
Total	69,079	24,648	93,727	465,972	80,480	28,789	109,269	507,636	86,910	31,261	118,171	524,940	94,934	33,966	128,900	533,919	Total

Table 4-4(4/4) ANNUAL FLOW OF ECONOMIC COST AND BENEFIT FOR FLOOD CONTROL AND WATER SUPPLY

** Water Supply Project **

Unit: Million Rp

Year	7.1 Lausimeme Dam				7.2 Namobatang Dam				7.3 Belumai Aqueduct			
	Economic Cost			Economic	Economic Cost			Economic	Economic Cost			Economic
	Const.	OMR	Total	Benefit	Const.	OMR	Total	Benefit	Const.	OMR	Total	Benefit
1	3,629	0	3,629	0	2,329	0	2,329	0	1,396	0	1,396	0
2	4,550	0	4,550	0	3,068	0	3,068	0	1,836	0	1,836	0
3	28,216	0	28,216	0	10,126	0	10,126	0	6,847	0	6,847	0
4	27,295	0	27,295	0	9,387	0	9,387	0	6,847	0	6,847	0
5	27,295	0	27,295	0	9,387	0	9,387	0	6,847	0	6,847	0
6	27,295	0	27,295	0	9,387	0	9,387	0	6,847	0	6,847	0
7	0	890	890	8,229	0	294	294	4,449	6,847	0	6,847	0
8	0	890	890	8,229	0	294	294	4,449	0	829	829	5,783
9	0	890	890	8,229	0	294	294	4,449	0	829	829	5,783
10	0	890	890	8,229	0	294	294	4,449	0	829	829	5,783
11	0	890	890	10,502	0	294	294	5,678	0	829	829	7,381
12	0	890	890	10,502	0	294	294	5,678	0	829	829	7,381
13	0	890	890	10,502	0	294	294	5,678	0	829	829	7,381
14	0	890	890	10,502	0	294	294	5,678	0	829	829	7,381
15	0	890	890	10,502	0	294	294	5,678	0	829	829	7,381
16	0	890	890	13,403	0	294	294	7,246	0	829	829	9,420
17	0	890	890	13,403	0	294	294	7,246	0	829	829	9,420
18	0	890	890	13,403	0	294	294	7,246	0	829	829	9,420
19	0	890	890	13,403	0	294	294	7,246	0	829	829	9,420
20	0	890	890	13,403	0	294	294	7,246	0	829	829	9,420
21	0	890	890	17,107	0	294	294	9,248	0	829	829	12,022
22	0	890	890	17,107	0	294	294	9,248	0	829	829	12,022
23	0	890	890	17,107	0	294	294	9,248	0	829	829	12,022
24	0	890	890	17,107	0	294	294	9,248	0	829	829	12,022
25	0	890	890	17,107	0	294	294	9,248	0	829	829	12,022
26	0	890	890	21,833	0	294	294	11,803	0	829	829	15,344
27	0	890	890	21,833	0	294	294	11,803	0	829	829	15,344
28	0	890	890	21,833	0	294	294	11,803	0	829	829	15,344
29	0	890	890	21,833	0	294	294	11,803	0	829	829	15,344
30	0	890	890	21,833	0	294	294	11,803	0	829	829	15,344
31	0	890	890	27,865	0	294	294	15,064	0	829	829	19,583
32	0	890	890	27,865	0	294	294	15,064	0	829	829	19,583
33	0	890	890	27,865	0	294	294	15,064	0	829	829	19,583
34	0	890	890	27,865	0	294	294	15,064	0	829	829	19,583
35	0	890	890	27,865	0	294	294	15,064	0	829	829	19,583
36	0	890	890	35,563	0	294	294	19,226	0	829	829	24,993
37	0	890	890	35,563	0	294	294	19,226	0	829	829	24,993
38	0	890	890	35,563	0	294	294	19,226	0	829	829	24,993
39	0	890	890	35,563	0	294	294	19,226	0	829	829	24,993
40	0	890	890	35,563	0	294	294	19,226	0	829	829	24,993
41	0	890	890	45,389	0	294	294	24,538	0	829	829	31,898
42	0	890	890	45,389	0	294	294	24,538	0	829	829	31,898
43	0	890	890	45,389	0	294	294	24,538	0	829	829	31,898
44	0	890	890	45,389	0	294	294	24,538	0	829	829	31,898
45	0	890	890	45,389	0	294	294	24,538	0	829	829	31,898
46	0	890	890	57,929	0	294	294	31,318	0	829	829	40,711
47	0	890	890	57,929	0	294	294	31,318	0	829	829	40,711
48	0	890	890	57,929	0	294	294	31,318	0	829	829	40,711
49	0	890	890	57,929	0	294	294	31,318	0	829	829	40,711
50	0	890	890	57,929	0	294	294	31,318	0	829	829	40,711
51	0	890	890	73,934	0	294	294	39,970	0	829	829	51,959
52	0	890	890	73,934	0	294	294	39,970	0	829	829	51,959
53	0	890	890	73,934	0	294	294	39,970	0	829	829	51,959
54	0	890	890	73,934	0	294	294	39,970	0	829	829	51,959
55	0	890	890	73,934	0	294	294	39,970	0	829	829	51,959
56	0	890	890	94,360	0	294	294	51,013	0	829	829	66,314
57	0	0	0	0	0	0	0	0	0	829	829	66,314
58	0	0	0	0	0	0	0	0	0	0	0	0
59	0	0	0	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0	0	0	0	0
61	0	0	0	0	0	0	0	0	0	0	0	0
62	0	0	0	0	0	0	0	0	0	0	0	0
63	0	0	0	0	0	0	0	0	0	0	0	0
64	0	0	0	0	0	0	0	0	0	0	0	0
65	0	0	0	0	0	0	0	0	0	0	0	0
66	0	0	0	0	0	0	0	0	0	0	0	0
67	0	0	0	0	0	0	0	0	0	0	0	0
Total	118,280	44,500	162,780	1,644,901	43,684	14,700	58,384	889,264	37,467	41,450	78,917	1,216,532

Table 4-5 RESULTS OF ECONOMIC ANALYSIS FOR FLOOD CONTROL AND WATER SUPPLY

1. Flood Control Project

(1) Belawan River

Evaluation Factor		Return Period 10-year	20-year	30-year	50-year	100-year
IRR (%)		-1.99	0.84	1.20	1.33	-
NPV (Million Rps.)						
Discount Rate	12 %	(10,717)	(12,211)	(13,696)	(15,327)	-
	10 %	(11,211)	(12,387)	(13,807)	(15,413)	-
	8 %	(11,635)	(12,252)	(13,521)	(15,032)	-
	5 %	(11,891)	(10,738)	(11,431)	(12,526)	-
	1 %	(9,623)	(847)	1,228	2,299	-
B/C						
Discount Rate	12 %	0.14	0.24	0.25	0.26	-
	10 %	0.16	0.28	0.30	0.31	-
	8 %	0.20	0.34	0.37	0.38	-
	5 %	0.29	0.50	0.53	0.55	-
	1 %	0.56	0.97	1.04	1.06	-

(2) Deli-Percut River System

Unit : Million Rp

Evaluation Factor		Return Period 10-year	20-year	30-year	50-year	100-year
IRR (%)		20.03	18.49	18.09	17.66	16.80
NPV (Million Rps.)						
Discount Rate	12 %	67,920	67,711	67,602	66,425	58,036
	10 %	109,255	113,639	115,135	115,214	106,081
	8 %	174,687	186,394	190,498	192,658	183,656
	5 %	366,572	399,779	411,714	420,220	418,216
	1 %	1,169,699	1,292,353	1,337,683	1,373,560	1,464,432
B/C						
Discount Rate	12 %	1.70	1.56	1.53	1.49	1.41
	10 %	2.03	1.86	1.82	1.78	1.69
	8 %	2.50	2.29	2.25	2.19	2.08
	5 %	3.69	3.37	3.31	3.23	3.10
	1 %	7.35	6.73	6.63	6.46	6.37

(3) Serdang River

Evaluation Factor		Return Period 10-year	20-year	30-year	50-year	100-year
IRR (%)		11.02	11.20	10.96	10.59	-
NPV (Million Rps.)						
Discount Rate	12 %	(4,736)	(4,140)	(5,605)	(7,983)	-
	10 %	6,249	7,886	6,622	4,306	-
	8 %	24,421	27,754	26,886	24,774	-
	5 %	79,742	88,170	88,686	87,475	-
	1 %	316,251	346,247	353,295	356,917	-
B/C						
Discount Rate	12 %	0.92	0.93	0.91	0.88	-
	10 %	1.10	1.12	1.09	1.06	-
	8 %	1.35	1.37	1.35	1.30	-
	5 %	1.99	2.02	1.98	1.91	-
	1 %	3.99	4.04	3.95	3.81	-

(4) Ular River

Evaluation Factor		Return Period 10-year	20-year	30-year	50-year	100-year
IRR (%)		-	8.79	6.54	8.92	-
NPV (Million Rps.)						
Discount Rate	12 %	-	(812)	(4,373)	(2,712)	-
	10 %	-	(388)	(3,467)	(1,195)	-
	8 %	-	328	(1,883)	1,315	-
	5 %	-	2,520	3,116	8,885	-
	1 %	-	11,742	24,587	40,312	-
B/C						
Discount Rate	12 %	-	0.75	0.57	0.75	-
	10 %	-	0.89	0.68	0.90	-
	8 %	-	1.09	0.84	1.11	-
	5 %	-	1.57	1.24	1.63	-
	1 %	-	3.01	2.47	3.26	-

(5) Belutu River

Evaluation Factor		Return Period 10-year	20-year	30-year	50-year	100-year
IRR (%)		2.94	3.14	3.12	2.95	-
NPV (Million Rps.)						
Discount Rate	12 %	(20,046)	(20,817)	(21,603)	(23,067)	-
	10 %	(19,610)	(20,259)	(21,046)	(22,589)	-
	8 %	(18,127)	(18,539)	(19,291)	(20,900)	-
	5 %	(11,543)	(11,136)	(11,687)	(13,315)	-
	1 %	23,713	27,958	28,607	27,521	-
B/C						
Discount Rate	12 %	0.32	0.34	0.34	0.33	-
	10 %	0.39	0.41	0.40	0.39	-
	8 %	0.48	0.50	0.50	0.49	-
	5 %	0.72	0.74	0.74	0.72	-
	1 %	1.44	1.49	1.48	1.44	-

(6) Padang River

Evaluation Factor		Return Period 10-year	20-year	30-year	50-year	100-year
IRR (%)		11.54	10.82	10.36	9.66	-
NPV (Million Rps.)						
Discount Rate	12 %	(1,692)	(4,837)	(7,187)	(10,741)	-
	10 %	7,261	4,323	2,052	(2,019)	-
	8 %	22,069	19,770	17,744	13,148	-
	5 %	67,174	67,718	66,769	61,587	-
	1 %	260,214	276,487	281,316	277,763	-
B/C						
Discount Rate	12 %	0.96	0.90	0.87	0.81	-
	10 %	1.15	1.08	1.03	0.97	-
	8 %	1.41	1.33	1.27	1.19	-
	5 %	2.08	1.95	1.87	1.75	-
	1 %	4.09	3.83	3.66	3.42	-

2. Water Supply Project

Evaluation Factor		Lausi-meme Dam	Namo-batang Dam	Belumai Aqueduct
IRR (%)		9.69	12.12	14.77
NPV (Million Rps.)				
Discount Rate	12 %	(22,757)	502	10,361
	10 %	(4,217)	11,817	25,105
	8 %	32,300	33,099	52,838
	5 %	170,844	111,071	155,533
	1 %	958,928	544,669	742,821
B/C				
Discount Rate	12 %	0.71	1.02	1.41
	10 %	0.95	1.38	1.88
	8 %	1.35	1.97	2.64
	5 %	2.58	3.79	4.83
	1 %	7.56	11.32	12.24

Note: ( ) shows a minus sign.

Table 4-6(1/2) ANNUAL FLOW OF ECONOMIC COST AND BENEFIT FOR MASTER PLAN

Unit : Million Rp

1. Flood Control Project

	Year	1.1 Belawan River(50-Year) Economic Cost Const.	OMR	Total	Economic Benefit	1.2 Deli-Percut River System (100-Year) Economic Cost Const.	OMR	Total	Economic Benefit	1.3 Serdang River (50-Year) Economic Cost Const.	OMR	Total	Economic Benefit	1.4 Ular River (50-Year) Economic Cost Const.	OMR	Total	Economic Benefit	1.5 Belutu River (50-Year) Economic Cost Const.	OMR	Total	Economic Benefit	1.6 Padang River (50-Year) Economic Cost Const.	OMR	Total	Economic Benefit	1.7 Integrated Flood Control Year	Economic Cost Const.	OMR	Total	Economic Benefit
1	1993	0	0	0	0	8,448	0	8,448	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1 1993	8,448	0	8,448	0
2	1994	0	0	0	0	19,673	0	19,673	0	0	0	0	0	0	0	0	0	0	0	0	0	3,386	0	3,386	0	2 1994	23,059	0	23,059	0
3	1995	0	0	0	0	45,980	0	45,980	0	0	0	0	0	0	0	0	0	0	0	0	0	8,892	0	8,892	0	3 1995	54,872	0	54,872	0
4	1996	0	0	0	0	34,755	330	35,085	9,897	0	0	0	0	0	0	0	0	0	0	0	0	11,808	0	11,808	0	4 1996	46,563	330	46,893	9,897
5	1997	0	0	0	0	41,892	579	42,471	17,378	0	0	0	0	0	0	0	0	0	0	0	0	11,808	95	11,903	1,496	5 1997	53,700	674	54,374	18,874
6	1998	0	0	0	0	31,057	879	31,936	26,396	0	0	0	0	0	0	0	0	0	0	0	0	11,808	190	11,998	2,991	6 1998	42,865	1,069	43,934	29,387
7	1999	0	0	0	0	16,628	1,101	17,729	33,081	0	0	0	0	0	0	0	0	0	0	0	0	11,808	285	12,093	4,487	7 1999	28,436	1,387	29,823	37,567
8	2000	0	0	0	0	10,686	1,220	11,906	36,660	0	0	0	0	0	0	0	0	0	0	0	0	11,808	381	12,189	5,982	8 2000	22,494	1,601	24,095	42,642
9	2001	0	0	0	0	4,044	1,297	5,341	38,960	3,336	0	3,336	0	0	0	0	0	0	0	0	0	11,808	476	12,284	7,478	9 2001	19,188	1,773	20,961	46,438
10	2002	0	0	0	0	4,044	1,326	5,370	39,831	12,299	0	12,299	0	0	0	0	0	0	0	0	0	11,808	571	12,379	8,973	10 2002	28,151	1,897	30,048	48,804
11	2003	0	0	0	0	4,044	1,355	5,399	40,701	25,270	0	25,270	0	0	0	0	0	0	0	0	0	0	666	666	10,469	11 2003	29,314	2,021	31,335	51,170
12	2004	0	0	0	0	4,044	1,384	5,428	41,572	16,306	183	16,489	3,498	0	0	0	0	1,693	0	1,693	0	0	666	666	10,469	12 2004	22,043	2,233	24,276	55,539
13	2005	0	0	0	0	0	1,413	1,413	42,442	16,306	302	16,608	5,755	0	0	0	0	9,348	0	9,348	0	0	666	666	10,469	13 2005	25,654	2,381	28,035	58,666
14	2006	1,017	0	1,017	0	0	1,413	1,413	42,442	16,306	420	16,726	8,013	1,393	0	1,393	0	8,267	0	8,267	0	0	666	666	10,469	14 2006	26,983	2,499	29,482	60,924
15	2007	3,523	0	3,523	0	0	1,413	1,413	42,442	16,306	539	16,845	10,270	2,009	0	2,009	0	8,267	67	8,334	471	0	666	666	10,469	15 2007	30,105	2,684	32,789	63,652
16	2008	8,282	0	8,282	0	0	1,413	1,413	42,442	0	657	657	12,527	3,907	0	3,907	0	8,267	133	8,400	942	0	666	666	10,469	16 2008	20,456	2,869	23,325	66,380
17	2009	8,282	67	8,349	334	0	1,413	1,413	42,442	0	657	657	12,527	3,907	28	3,935	507	8,267	200	8,467	1,412	0	666	666	10,469	17 2009	20,456	3,030	23,486	67,691
18	2010	8,282	133	8,415	667	0	1,413	1,413	42,442	0	657	657	12,527	3,907	56	3,963	1,013	8,267	266	8,533	1,883	0	666	666	10,469	18 2010	20,456	3,192	23,648	69,002
19	2011	0	200	200	1,001	0	1,413	1,413	42,442	0	657	657	12,527	0	84	84	1,520	0	333	333	2,354	0	666	666	10,469	19 2011	0	3,353	3,353	70,313
20	2012	0	200	200	1,001	0	1,413	1,413	42,442	0	657	657	12,527	0	84	84	1,520	0	333	333	2,354	0	666	666	10,469	20 2012	0	3,353	3,353	70,313
21	2013	0	200	200	1,001	0	1,413	1,413	42,442	0	657	657	12,527	0	84	84	1,520	0	333	333	2,354	0	666	666	10,469	21 2013	0	3,353	3,353	70,313
22	2014	0	200	200	1,001	0	1,413	1,413	42,442	0	657	657	12,527	0	84	84	1,520	0	333	333	2,354	0	666	666	10,469	22 2014	0	3,353	3,353	70,313
23	2015	0	200	200	1,001	0	1,413	1,413	42,442	0	657	657	12,527	0	84	84	1,520	0	333	333	2,354	0	666	666	10,469	23 2015	0	3,353	3,353	70,313
24	2016	0	200	200	1,001	0	1,413	1,413	42,442	0	657	657	12,527	0	84	84	1,520	0	333	333	2,354	0	666	666	10,469	24 2016	0	3,353	3,353	70,313
25	2017	0	200	200	1,001	0	1,413	1,413	42,442	0	657	657	12,527	0	84	84	1,520	0	333	333	2,354	0	666	666	10,469	25 2017	0	3,353	3,353	70,313
26	2018	0	200	200	1,001	0	1,413	1,413	42,442	0	657	657	12,527	0	84	84	1,520	0	333	333	2,354	0	666	666	10,469	26 2018	0	3,353	3,353	70,313
27	2019	0	200	200	1,001	0	1,413	1,413	42,442	0	657	657	12,527	0	84	84	1,520	0	333	333	2,354	0	666	666	10,469	27 2019	0	3,353	3,353	70,313
28	2020	0	200	200	1,001	0	1,413	1,413	42,442	0	657	657	12,527	0	84	84	1,520	0	333	333	2,354	0	666	666	10,469	28 2020	0	3,353	3,353	70,313
29	2021	0	200	200	1,001	0	1,413	1,413	42,442	0	657	657	12,527	0	84	84	1,520	0	333	333	2,354	0	666	666	10,469	29 2021	0	3,353	3,353	70,313
30	2022	0	200	200	1,001	0	1,413	1,413	42,442	0	657	657	12,527	0	84	84	1,520	0	333	333	2,354	0	666	666	10,469	30 2022	0	3,353	3,353	70,313
31	2023	0	200	200	1,001	0	1,413	1,413	42,442	0	657	657	12,527	0	84	84	1,520	0	333	333	2,354	0	666	666	10,469	31 2023	0	3,353	3,353	70,313
32	2024	0	200	200	1,001	0	1,413	1,413	42,442	0	657	657	12,527	0	84	84	1,520	0	333	333	2,354	0	666	666	10,469	32 2024	0	3,353	3,353	70,313
33	2025	0	200	200	1,001	0	1,413	1,413	42,442	0	657	657	12,527	0	84	84	1,520	0	333	333	2,354	0	666	666	10,469	33 2025	0	3,353	3,353	70,313
34	2026	0	200	200	1,001	0	1,413	1,413	42,442	0	657	657	12,527	0	84	84	1,520	0	333	333	2,354	0	666	666	10,469	34 2026	0	3,353	3,353	70,313
35	2027	0	200	200	1,001	0	1,413	1,413	42,442	0	657	657	12,527	0	84	84	1,520	0	333	333	2,354	0	666	666	10,469	35 2027	0	3,353	3,353	70,313
36	2028	0	200	200	1,001	0	1,413	1,413	42,442	0	657	657	12,527	0	84	84	1,520	0	333	333	2,354	0	666	666	10,469	36 2028	0	3,353	3,353	70,313
37	2029	0	200	200	1,001	0	1,413	1,413	42,442	0	657	657	12,527	0	84	84	1,520	0	333	333	2,354	0	666	666	10,469	37 2029	0	3,353	3,353	70,313
38	2030	0	200	200	1,001	0	1,413	1,413	42,442	0	657	657	12,527	0	84	84	1,520	0	333	333	2,354	0	666	666	10,469	38 2030	0	3,353	3,353	70,313
39	2031	0	200	200	1,001	0	1,413	1,413	42,442	0	657	657	12,527	0	84	84	1,520	0	333	333	2,354	0	666	666	10,469	39 2031	0	3,353	3,353	70,313
40	2032	0	200	200	1,001	0	1,413	1,413	42,442	0	657	657	12,527	0	84	84	1,520	0	333	333	2,354	0	666	666	10,469	40 2032	0	3,353	3,353	70,313
41	2033	0	200	200	1,001	0	1,413	1,413	42,442	0	657	657	12,527	0	84	84	1,520	0	333	333	2,354	0	666	666	10,469	41 2033	0	3,353	3,353	70,313
42	2034	0	200	200	1,001	0	1,413	1,413	42,442	0	657	657	12,527	0	84	84	1,520	0	333	333	2,354	0	666	666	10,469	42 2034	0	3,353	3,353	70,313
43	2035	0	200	200	1,001	0	1,413	1,413	42,442	0	657	657	12,527	0	84	84	1,520	0	333	333	2,354	0	666	666	10,469	43 2035	0	3,353	3,353	70,313
44	2036	0	200	200	1,001	0	1,413	1,413	42,442	0	657	657	12,527	0	84	84	1,520	0	333	333	2,354	0	666	666	10,469	44 2036	0	3,353	3,353	70,313
45	2037	0	200	200	1,001	0	1,413	1,413	42,442	0	657	657	12,527	0	84	84	1,520	0	333	333	2,354	0	666	666	10,469	45 2037	0	3,353	3,353	70,313
46	2038	0	200	200	1,001	0	1,413	1,413	42,442	0	657	657	12,527	0	84	84	1,520	0	333	333	2,354	0	666	666	10,469	46 2038	0	3,353	3,353	70,313
47	2039	0	200	200	1,001	0	1,413	1,413	42,442	0	657	657	12,527	0	84	84	1,520	0	333	333	2,354	0	666	666	10,469	47 2039	0	3,353	3,353	70,313
48	2040	0	200	200	1,001	0	1,413	1,413	42,442	0	657	657	12,527	0	84	84	1,520	0	333	333	2,354	0	666	666	10,469	48 2040	0	3,353	3,353	70,313
49	2041	0	200	200	1,001	0	1,413	1,413	42,442	0	657	657	12,527	0	84	84	1,520	0	333	333	2,354	0	666	666	10,469	49 2041	0	3,353	3,353	70,313
50	2042	0	200	200	1,001	0	1,413	1,413	42,442	0	657	657	12,527	0	84	84	1,520	0	333	333	2,354	0	666	666	10,469	50 2042	0	3,353	3,353	70,313
51	2043	0	200	200	1,001	0	1,413	1,413	42,442	0	657	657	12,527	0	84	84	1,520	0	333	333	2,354	0	666	666	10,469	51 2043	0	3,353	3,353	70,313
52	2044	0	200	200	1,001	0	1,413	1,413	42,442	0	657	657	12,527	0	84	84	1,520	0	333	333	2,354	0	666	666	10,469	52 2044	0	3,353	3,353	70,313
53	2045	0	200	200	1,001	0	1,413	1,413	42,442	0	657	657	12,527	0	84	84	1,520	0	333	333	2,354	0	666	666	10,469	53 2045	0	3,353	3,353	70,313
54	2046	0	200	200	1,001	0	1,413	1,413	42,442	0	657	657	12,527	0	84	84	1,520	0	333	333	2,354	0	666	666	10,469	54 2046	0	3,353	3,353	70,313
55	2047	0	200	200	1,001	0	1,413	1,413	42,442	0	657	657	12,527	0	84	84	1,520	0	333	333	2,354	0	666	666	10,469	55 2047	0	3,353	3,353	70,313
56	2048	0	200	200	1,001	0	1,413	1,413	42,442	0	657	657	12,527	0	84	84	1,520	0	333	333	2,354	0	666	666	10,469	56 2048	0	3,353	3,353	70,313
57	2049	0	200	200	1,001	0	1,413	1,413	42,442	0	657	657	12,527	0	84	84	1,520	0	333	333	2,354	0	666	666	10,469	57 2049	0	3,353	3,353	70,313
58	2050	0	200	200	1,001	0	1,413	1,413	42,442	0	657	657	12,527	0	84	84	1,520	0	333	333	2,354	0	666	666	10,469	58 2050	0	3,353	3,353	70,313
59	2051	0	200	200	1,001	0	1,413	1,413	42,442	0	657	657	12,527	0	84	84	1,520	0	333	333	2,354	0	0	0	0	59 2051	0	2,687	2,687	59,844
60	2052	0	200	200	1,001	0	1,413	1,413	42,442	0	657	657	12,527	0	84	84	1,520	0	333	333	2,354	0	0	0	0	60 2052	0	2,687	2,687	59,844
61	2053	0	200	200	1,001	0	1,413	1,413	42,442	0	657	657	12,527	0	84	84	1,520	0	333	333	2,354	0	0	0	0	61 2053	0	2,687	2,687	59,844
62	2054	0	200	200	1,001	0	1,413	1,413	42,442	0	657	657	12,527	0	84	84	1,520	0	333	333	2,354	0	0	0	0	62 2054	0	2,687	2,687	59,844
63	2055	0	200	200	1,001	0	0	0	0	0	657	657	12,527	0	84	84	1,520	0	333	333	2,354	0	0	0	0	63 2055	0	1,274	1,274	17,402
64	2056	0	200	200	1,001	0	0	0	0	0	657	657	12,527	0	84	84	1,520	0	333	333	2,354	0	0	0	0	64 2056	0	1,274	1,274	17,402
65	2057	0	200	200	1,001	0	0	0	0	0	657	657	12,527	0	84	84	1,520	0	333	333	2,354	0	0	0	0	65 2057	0	1,274	1,274	17,402
66	2058	0	200	200	1,001	0	0	0	0	0	0	0	0	0	84	84	1,520	0	333	333	2,354	0	0	0	0	66 2058	0	617	617	4,875
67	2059	0	200	200	1,001	0	0	0	0	0	0	0	0	0	84	84	1,520	0	333	333	2,354	0	0	0	0	67 2059	0	617	617	4,875
68	2060	0	200	200	1,001	0	0	0	0	0	0	0	0	0	84	84	1,520	0	333	333	2,354	0	0	0	0	68 2060	0	617	617	4,875
69																										69				
70	Total	29,386	10,200	39,586	51,051	225,295	80,121	305,416	2,406,575	106,129	34,294	140,423	653,886	15,123	4,284	19,407	77,520	52,376	17,316	69,692	122,408	94,934	33,966	128,900	533,919	70 Total	523,243	180,181	703,424	3,845,359

Table 4-6(2/2) ANNUAL FLOW OF ECONOMIC COST AND BEMEFIT FOR MASTER PLAN

Unit : Million Rp

Year	2. Water Supply Project 2.1 Lausimeme Dam Economic Cost Const.	OMR	Total	Economic Benefit	2.2 Namobatang Dam Economic Cost Const.	OMR	Total	Economic Benefit	2.3 Belumai Aqueduct Economic Cost Const.	OMR	Total	Economic Benefit	2.4 Integrated Water Supply Economic Cost Const.	OMR	Total	Economic Benefit
1 1993	3,629	0	3,629	0	0	0	0	0	0	0	0	0	3,629	0	3,629	0
2 1994	4,550	0	4,550	0	0	0	0	0	0	0	0	0	4,550	0	4,550	0
3 1995	28,216	0	28,216	0	0	0	0	0	0	0	0	0	28,216	0	28,216	0
4 1996	27,295	0	27,295	0	0	0	0	0	0	0	0	0	27,295	0	27,295	0
5 1997	27,295	0	27,295	0	0	0	0	0	0	0	0	0	27,295	0	27,295	0
6 1998	27,295	0	27,295	0	0	0	0	0	0	0	0	0	27,295	0	27,295	0
7 1999	0	890	890	8,229	2,329	0	2,329	0	0	0	0	0	2,329	890	3,219	8,229
8 2000	0	890	890	8,229	3,068	0	3,068	0	0	0	0	0	3,068	890	3,958	8,229
9 2001	0	890	890	8,229	10,126	0	10,126	0	1,396	0	1,396	0	11,522	890	12,412	8,229
10 2002	0	890	890	8,229	9,387	0	9,387	0	1,836	0	1,836	0	11,223	890	12,113	8,229
11 2003	0	890	890	10,502	9,387	0	9,387	0	6,847	0	6,847	0	16,234	890	17,124	10,502
12 2004	0	890	890	10,502	9,387	0	9,387	0	6,847	0	6,847	0	16,234	890	17,124	10,502
13 2005	0	890	890	10,502	0	294	294	4,449	6,847	0	6,847	0	6,847	1,184	8,031	14,951
14 2006	0	890	890	10,502	0	294	294	4,449	6,847	0	6,847	0	6,847	1,184	8,031	14,951
15 2007	0	890	890	10,502	0	294	294	4,449	6,847	0	6,847	0	6,847	1,184	8,031	14,951
16 2008	0	890	890	13,403	0	294	294	4,449	0	829	829	5,783	0	2,013	2,013	23,635
17 2009	0	890	890	13,403	0	294	294	5,678	0	829	829	5,783	0	2,013	2,013	24,864
18 2010	0	890	890	13,403	0	294	294	5,678	0	829	829	5,783	0	2,013	2,013	24,864
19 2011	0	890	890	13,403	0	294	294	5,678	0	829	829	7,381	0	2,013	2,013	26,462
20 2012	0	890	890	13,403	0	294	294	5,678	0	829	829	7,381	0	2,013	2,013	26,462
21 2013	0	890	890	17,107	0	294	294	5,678	0	829	829	7,381	0	2,013	2,013	30,166
22 2014	0	890	890	17,107	0	294	294	7,246	0	829	829	7,381	0	2,013	2,013	31,734
23 2015	0	890	890	17,107	0	294	294	7,246	0	829	829	7,381	0	2,013	2,013	31,734
24 2016	0	890	890	17,107	0	294	294	7,246	0	829	829	9,420	0	2,013	2,013	33,773
25 2017	0	890	890	17,107	0	294	294	7,246	0	829	829	9,420	0	2,013	2,013	33,773
26 2018	0	890	890	21,833	0	294	294	7,246	0	829	829	9,420	0	2,013	2,013	38,499
27 2019	0	890	890	21,833	0	294	294	9,248	0	829	829	9,420	0	2,013	2,013	40,501
28 2020	0	890	890	21,833	0	294	294	9,248	0	829	829	9,420	0	2,013	2,013	40,501
29 2021	0	890	890	21,833	0	294	294	9,248	0	829	829	12,022	0	2,013	2,013	43,103
30 2022	0	890	890	21,833	0	294	294	9,248	0	829	829	12,022	0	2,013	2,013	43,103
31 2023	0	890	890	27,865	0	294	294	9,248	0	829	829	12,022	0	2,013	2,013	49,135
32 2024	0	890	890	27,865	0	294	294	11,803	0	829	829	12,022	0	2,013	2,013	51,690
33 2025	0	890	890	27,865	0	294	294	11,803	0	829	829	12,022	0	2,013	2,013	51,690
34 2026	0	890	890	27,865	0	294	294	11,803	0	829	829	15,344	0	2,013	2,013	55,012
35 2027	0	890	890	27,865	0	294	294	11,803	0	829	829	15,344	0	2,013	2,013	55,012
36 2028	0	890	890	35,563	0	294	294	11,803	0	829	829	15,344	0	2,013	2,013	62,710
37 2029	0	890	890	35,563	0	294	294	15,064	0	829	829	15,344	0	2,013	2,013	65,971
38 2030	0	890	890	35,563	0	294	294	15,064	0	829	829	15,344	0	2,013	2,013	65,971
39 2031	0	890	890	35,563	0	294	294	15,064	0	829	829	19,583	0	2,013	2,013	70,210
40 2032	0	890	890	35,563	0	294	294	15,064	0	829	829	19,583	0	2,013	2,013	70,210
41 2033	0	890	890	45,389	0	294	294	15,064	0	829	829	19,583	0	2,013	2,013	80,036
42 2034	0	890	890	45,389	0	294	294	19,226	0	829	829	19,583	0	2,013	2,013	84,198
43 2035	0	890	890	45,389	0	294	294	19,226	0	829	829	19,583	0	2,013	2,013	84,198
44 2036	0	890	890	45,389	0	294	294	19,226	0	829	829	24,993	0	2,013	2,013	89,608
45 2037	0	890	890	45,389	0	294	294	19,226	0	829	829	24,993	0	2,013	2,013	89,608
46 2038	0	890	890	57,929	0	294	294	19,226	0	829	829	24,993	0	2,013	2,013	102,148
47 2039	0	890	890	57,929	0	294	294	24,538	0	829	829	24,993	0	2,013	2,013	107,460
48 2040	0	890	890	57,929	0	294	294	24,538	0	829	829	24,993	0	2,013	2,013	107,460
49 2041	0	890	890	57,929	0	294	294	24,538	0	829	829	31,898	0	2,013	2,013	114,365
50 2042	0	890	890	57,929	0	294	294	24,538	0	829	829	31,898	0	2,013	2,013	114,365
51 2043	0	890	890	73,934	0	294	294	24,538	0	829	829	31,898	0	2,013	2,013	130,370
52 2044	0	890	890	73,934	0	294	294	31,318	0	829	829	31,898	0	2,013	2,013	137,150
53 2045	0	890	890	73,934	0	294	294	31,318	0	829	829	31,898	0	2,013	2,013	137,150
54 2046	0	890	890	73,934	0	294	294	31,318	0	829	829	40,711	0	2,013	2,013	145,963
55 2047	0	890	890	73,934	0	294	294	31,318	0	829	829	40,711	0	2,013	2,013	145,963
56 2048	0	890	890	94,360	0	294	294	31,318	0	829	829	40,711	0	2,013	2,013	166,389
57 2049	0	0	0	0	0	294	294	39,970	0	829	829	40,711	0	1,123	1,123	80,681
58 2050	0	0	0	0	0	294	294	39,970	0	829	829	40,711	0	1,123	1,123	80,681
59 2051	0	0	0	0	0	294	294	39,970	0	829	829	51,959	0	1,123	1,123	91,929
60 2052	0	0	0	0	0	294	294	39,970	0	829	829	51,959	0	1,123	1,123	91,929
61 2053	0	0	0	0	0	294	294	39,970	0	829	829	51,959	0	1,123	1,123	91,929
62 2054	0	0	0	0	0	294	294	51,013	0	829	829	51,959	0	1,123	1,123	102,972
63 2055	0	0	0	0	0	0	0	0	0	829	829	51,959	0	829	829	51,959
64 2056	0	0	0	0	0	0	0	0	0	829	829	66,314	0	829	829	66,314
65 2057	0	0	0	0	0	0	0	0	0	829	829	66,314	0	829	829	66,314
66 2058	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
67 2059	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
68 2060	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
69																
70 Total	118,280	44,500	162,780	1,644,901	43,684	14,700	58,384	889,264	37,467	41,450	78,917	1,216,532	199,431	100,650	300,081	3,750,697

Year	3.1 Deli-Percut River System (F+W) Economic Cost Const.	OMR	Total	Economic Benefit	3.2 Integrated Flood Control and Water Supply Economic Cost Const.	OMR	Total	Economic Benefit
1 1993	12,077	0	12,077	0	12,077	0	12,077	0
2 1994	24,223	0	24,223	0	27,609	0	27,609	0
3 1995	74,196	0	74,196	0	83,088	0	83,088	0
4 1996	62,050	330	62,380	9,897	73,858	330	74,188	9,897
5 1997	69,187	579	69,766	17,378	80,995	674	81,669	18,874
6 1998	58,352	879	59,231	26,396	70,160	1,069	71,229	29,387
7 1999	18,957	1,991	20,948	41,310	30,765	2,277	33,042	45,796
8 2000	13,754	2,110	15,864	44,889	25,562	2,491	28,053	50,871
9 2001	14,170	2,187	16,357	47,189	30,710	2,663	33,373	54,667
10 2002	13,431	2,216	15,647	48,060	39,374	2,787	42,161	57,033
11 2003	13,431	2,245	15,676	51,203	45,548	2,911	48,459	61,672
12 2004	13,431	2,274	15,705	52,074	38,277	3,123	41,400	66,041
13 2005	0	2,597	2,597	57,393	32,501	3,565	36,066	73,617
14 2006	0	2,597	2,597	57,393	33,830	3,683	37,513	75,875
15 2007	0	2,597	2,597	57,393	36,952	3,868	40,820	78,603
16 2008	0	2,597	2,597	60,294	20,456	4,882	25,338	90,015
17 2009	0	2,597	2,597	61,523	20,456	5,043	25,499	92,555
18 2010	0	2,597	2,597	61,523	20,456	5,205	25,661	93,866
19 2011	0	2,597	2,597	61,523	0	5,366	5,366	96,775
20 2012	0	2,597	2,597	61,523	0	5,366	5,366	96,775
21 2013	0	2,597	2,597	65,227	0	5,366	5,366	100,479
22 2014	0	2,597	2,597	66,795	0	5,366	5,366	102,047
23 2015	0	2,597	2,597	66,795	0	5,366	5,366	102,047
24 2016	0	2,597	2,597	66,795	0	5,366	5,366	104,086
25 2017	0	2,597	2,597	66,795	0	5,366	5,366	104,086
26 2018	0	2,597	2,597	71,521	0	5,366	5,366	108,812
27 2019	0	2,597	2,597	73,523	0	5,366	5,366	110,814
28 2020	0	2,597	2,597	73,523	0	5,366	5,366	110,814
29 2021	0	2,597	2,597	73,523	0	5,366	5,366	113,416
30 2022	0	2,597	2,597	73,523	0	5,366	5,366	113,416
31 2023	0	2,597	2,597	79,555	0	5,366	5,366	119,448
32 2024	0	2,597	2,597	82,110	0	5,366	5,366	122,003
33 2025	0	2,597	2,597	82,110	0	5,366	5,366	122,003
34 2026	0	2,597	2,597	82,110	0	5,366	5,366	125,325
35 2027	0	2,597	2,597	82,110	0	5,366	5,366	125,325
36 2028	0	2,597	2,597	89,808	0	5,366	5,366	133,023
37 2029	0	2,597	2,597	93,069	0	5,366	5,366	136,284
38 2030	0	2,597	2,597	93,069	0	5,366	5,366	136,284
39 2031	0	2,597	2,597	93,069	0	5,366	5,366	140,523
40 2032	0	2,597	2,597	93,069	0	5,366	5,366	140,523
41 2033	0	2,597	2,597	102,895	0	5,366	5,366	150,349
42 2034	0	2,597	2,597	107,057	0	5,366	5,366	154,511
43 2035	0	2,597	2,597	107,057	0	5,366	5,366	154,511
44 2036	0	2,597	2,597	107,057	0	5,366	5,366	159,921
45 2037	0	2,597	2,597	107,057	0	5,366	5,366	159,921
46 2038	0	2,597	2,597	119,597	0	5,366	5,366	172,461
47 2039	0	2,597	2,597	124,909	0	5,366	5,366	177,773
48 2040	0	2,597	2,597	124,909	0	5,366	5,366	177,773
49 2041	0	2,597	2,597	124,909	0	5,366	5,366	184,678
50 2042	0	2,597	2,597	124,909	0	5,366	5,366	184,678
51 2043	0	2,597	2,597	140,914	0	5,366	5,366	200,683
52 2044	0	2,597	2,597	147,694	0	5,366	5,366	207,463
53 2045	0	2,597	2,597	147,694	0	5,366	5,366	207,463
54 2046	0	2,597	2,597	147,694	0	5,366	5,366	216,276
55 2047	0	2,597	2,597	147,694	0	5,366	5,366	216,276
56 2048	0	2,597	2,597	168,120	0	5,366	5,366	236,702
57 2049	0	1,707	1,707	82,412	0	4,476	4,476	150,994
58 2050	0	1,707	1,707	82,412	0	4,476	4,476	150,994
59 2051	0	1,707	1,707	82,412	0	3,810	3,810	151,773
60 2052	0	1,707	1,707	82,412	0	3,810	3,810	151,773
61 2053	0	1,707	1,707	82,412	0	3,810	3,810	151,773
62 2054	0	1,707	1,707	93,455	0	3,810	3,810	162,816
63 2055	0	0	0	0	0	2,103	2,103	69,361
64 2056	0	0	0	0	0	2,103	2,103	83,716
65 2057	0	0	0	0	0	2,103	2,103	83,716
66 2058	0	0	0	0	0	617	617	4,875
67 2059	0	0	0	0	0	617	617	4,875
68 2060	0	0	0	0	0	617	617	4,875
69								
70 Total	387,259	139,321	526,580	4,940,740	722,674	280,831	1,003,505	7,596,056

Table 4-7 RESULTS OF ECONOMIC ANALYSIS FOR MASTER PLAN

Evaluation Items		Integrated Flood Control	Deli-Percut River System (F+W)	Integrated Water Supply	Integrated Project (F+W)
IRR (%)		13.92	13.55	10.70	12.52
NPV (Million Rp.)					
Discount	12 %	34,455	35,533	(18,318)	16,136
Rate	10 %	93,520	108,534	14,164	107,684
	8 %	195,184	236,814	81,705	276,889
	5 %	526,206	671,943	358,998	885,204
	1 %	2,128,995	2,936,463	2,158,014	4,287,009
B/C					
Discount	12 %	1.15	1.15	0.82	1.05
Rate	10 %	1.35	1.42	1.12	1.28
	8 %	1.63	1.84	1.62	1.63
	5 %	2.34	2.99	3.17	2.59
	1 %	4.51	7.27	9.40	5.96

Note: ( ) means a negative value.

Table 4-8 ANNUAL WATER SUPPLY BENEFIT

		1. LAUSIMEME DAM			2. NAMOBATANG DAM			3. BELUMAI AQUEDUCT			4. LAUSIMEME & NAMOBATANG DAMS			5. INTEGRATED PROJECT			
No.	Year	(1+r)^(n-1)	Production (mill. Rp)	Average by 5-Year (mill. Rp)	(1+r)^(n-1)	Production (mill. Rp)	Average by 5-Year (mill. Rp)	(1+r)^(n-1)	Production (mill. Rp)	Average by 5-Year (mill. Rp)	(1+r)^(n-1)	Production (mill. Rp)	Average by 5-Year (mill. Rp)	(1+r)^(n-1)	Production (mill. Rp)	Average by 5-Year (mill. Rp)	Year
1	1993	1.000	5,834		1.000	3,154		1.000	4,100		1.000	8,988		1.000	13,087		1993
2	1994	1.050	6,126		1.050	3,312		1.050	4,305		1.050	9,437		1.050	13,741		1994
3	1995	1.102	6,432	6,447	1.102	3,477	3,486	1.102	4,520	4,531	1.102	9,909	9,933	1.102	14,428	14,463	1995
4	1996	1.158	6,754		1.158	3,651		1.158	4,746		1.158	10,405		1.158	15,150		1996
5	1997	1.216	7,091		1.216	3,834		1.216	4,984		1.216	10,925		1.216	15,907		1997
6	1998	1.276	7,446		1.276	4,025		1.276	5,233		1.276	11,471		1.276	16,703		1998
7	1999	1.340	7,818		1.340	4,227		1.340	5,494		1.340	12,045		1.340	17,538		1999
8	2000	1.407	8,209	8,229	1.407	4,438	4,449	1.407	5,769	5,783	1.407	12,647	12,677	1.407	18,415	18,459	2000
9	2001	1.477	8,619		1.477	4,660		1.477	6,058		1.477	13,279		1.477	19,335		2001
10	2002	1.551	9,050		1.551	4,893		1.551	6,360		1.551	13,943		1.551	20,302		2002
11	2003	1.629	9,503		1.629	5,138		1.629	6,678		1.629	14,641		1.629	21,317		2003
12	2004	1.710	9,978		1.710	5,394		1.710	7,012		1.710	15,373		1.710	22,383		2004
13	2005	1.796	10,477	10,502	1.796	5,664	5,678	1.796	7,363	7,381	1.796	16,141	16,180	1.796	23,502	23,558	2005
14	2006	1.886	11,001		1.886	5,947		1.886	7,731		1.886	16,948		1.886	24,677		2006
15	2007	1.980	11,551		1.980	6,245		1.980	8,118		1.980	17,796		1.980	25,911		2007
16	2008	2.079	12,128		2.079	6,557		2.079	8,524		2.079	18,685		2.079	27,207		2008
17	2009	2.183	12,735		2.183	6,885		2.183	8,950		2.183	19,620		2.183	28,567		2009
18	2010	2.292	13,372	13,403	2.292	7,229	7,246	2.292	9,397	9,420	2.292	20,601	20,650	2.292	29,996	30,067	2010
19	2011	2.407	14,040		2.407	7,590		2.407	9,867		2.407	21,631		2.407	31,495		2011
20	2012	2.527	14,742		2.527	7,970		2.527	10,360		2.527	22,712		2.527	33,070		2012
21	2013	2.653	15,479		2.653	8,369		2.653	10,879		2.653	23,848		2.653	34,724		2013
22	2014	2.786	16,253		2.786	8,787		2.786	11,422		2.786	25,040		2.786	36,460		2014
23	2015	2.925	17,066	17,107	2.925	9,226	9,248	2.925	11,994	12,022	2.925	26,292	26,355	2.925	38,283	38,374	2015
24	2016	3.072	17,919		3.072	9,688		3.072	12,593		3.072	27,607		3.072	40,197		2016
25	2017	3.225	18,815		3.225	10,172		3.225	13,223		3.225	28,987		3.225	42,207		2017
26	2018	3.386	19,756		3.386	10,681		3.386	13,884		3.386	30,437		3.386	44,317		2018
27	2019	3.556	20,744		3.556	11,215		3.556	14,578		3.556	31,958		3.556	46,533		2019
28	2020	3.733	21,781	21,833	3.733	11,775	11,803	3.733	15,307	15,344	3.733	33,556	33,636	3.733	48,860	48,976	2020
29	2021	3.920	22,870		3.920	12,364		3.920	16,073		3.920	35,234		3.920	51,303		2021
30	2022	4.116	24,014		4.116	12,982		4.116	16,876		4.116	36,996		4.116	53,868		2022
31	2023	4.322	25,214		4.322	13,631		4.322	17,720		4.322	38,846		4.322	56,561		2023
32	2024	4.538	26,475		4.538	14,313		4.538	18,606		4.538	40,788		4.538	59,389		2024
33	2025	4.765	27,799	27,865	4.765	15,029	15,064	4.765	19,536	19,583	4.765	42,827	42,929	4.765	62,359	62,507	2025
34	2026	5.003	29,189		5.003	15,780		5.003	20,513		5.003	44,969		5.003	65,477		2026
35	2027	5.253	30,648		5.253	16,569		5.253	21,539		5.253	47,217		5.253	68,751		2027
36	2028	5.516	32,180		5.516	17,398		5.516	22,616		5.516	49,578		5.516	72,188		2028
37	2029	5.792	33,789		5.792	18,267		5.792	23,746		5.792	52,057		5.792	75,797		2029
38	2030	6.081	35,479	35,563	6.081	19,181	19,226	6.081	24,934	24,993	6.081	54,660	54,790	6.081	79,587	79,777	2030
39	2031	6.385	37,253		6.385	20,140		6.385	26,180		6.385	57,393		6.385	83,567		2031
40	2032	6.705	39,116		6.705	21,147		6.705	27,489		6.705	60,262		6.705	87,745		2032
41	2033	7.040	41,071		7.040	22,204		7.040	28,864		7.040	63,275		7.040	92,132		2033
42	2034	7.392	43,125		7.392	23,314		7.392	30,307		7.392	66,439		7.392	96,739		2034
43	2035	7.762	45,281	45,389	7.762	24,480	24,538	7.762	31,823	31,898	7.762	69,761	69,927	7.762	101,576	101,818	2035
44	2036	8.150	47,545		8.150	25,704		8.150	33,414		8.150	73,249		8.150	106,655		2036
45	2037	8.557	49,922		8.557	26,989		8.557	35,084		8.557	76,912		8.557	111,987		2037
46	2038	8.985	52,419		8.985	28,339		8.985	36,839		8.985	80,757		8.985	117,587		2038
47	2039	9.434	55,039		9.434	29,756		9.434	38,680		9.434	84,795		9.434	123,466		2039
48	2040	9.906	57,791	57,929	9.906	31,243	31,318	9.906	40,614	40,711	9.906	89,035	89,247	9.906	129,639	129,948	2040
49	2041	10.401	60,681		10.401	32,806		10.401	42,645		10.401	93,487		10.401	136,121		2041
50	2042	10.921	63,715		10.921	34,446		10.921	44,777		10.921	98,161		10.921	142,927		2042
51	2043	11.467	66,901		11.467	36,168		11.467	47,016		11.467	103,069		11.467	150,074		2043
52	2044	12.041	70,246		12.041	37,977		12.041	49,367		12.041	108,222		12.041	157,578		2044
53	2045	12.643	73,758	73,934	12.643	39,875	39,970	12.643	51,836	51,959	12.643	113,634	113,904	12.643	165,456	165,851	2045
54	2046	13.275	77,446		13.275	41,869		13.275	54,427		13.275	119,315		13.275	173,729		2046
55	2047	13.939	81,318		13.939	43,963		13.939	57,149		13.939	125,281		13.939	182,416		2047
56	2048	14.636	85,384		14.636	46,161		14.636	60,006		14.636	131,545		14.636	191,537		2048
57	2049	15.367	89,653		15.367	48,469		15.367	63,006		15.367	138,122		15.367	201,113		2049
58	2050	16.136	94,136	94,360	16.136	50,892	51,013	16.136	66,157	66,314	16.136	145,028	145,374	16.136	211,169	211,672	2050
59	2051	16.943	98,843		16.943	53,437		16.943	69,465		16.943	152,280		16.943	221,727		2051
60	2052	17.790	103,785		17.790	56,109		17.790	72,938		17.790	159,894		17.790	232,814		2052

Table 5-1 PROJECT COST OF URGENT PROJECT

Item	Feature	Unit	Quantity	Cost (million Rp.) F.C.	L.C.	Total
1. Construction Base Cost						
1.1 Deli River Improvement	L = 37.4 km			43,924	32,915	76,839
Preparatory Works		L/S		7,320	5,486	12,806
Excavation		1000 m3	2,352	9,351	4,201	13,552
Embankment		1000 m3	492	3,901	2,009	5,910
Revetment		1000 m2	545	12,157	17,487	29,644
Parapet Wall		m	2,500	2,220	740	2,960
Sluiceway		site	5	487	162	649
Drain		site	97	856	286	1,142
Bridge		site	19	7,632	2,544	10,176
1.2 Medan Floodway	L = 3.8 km			13,233	8,118	21,351
Preparatory Works		L/S		1,203	738	1,941
Excavation		1000 m3	1,166	4,665	2,096	6,761
Embankment		1000 m3	16	124	64	188
Revetment		1000 m2	97	2,035	2,811	4,846
Weir (Floodway Side)		site	1	1,061	701	1,762
Weir (Deli River Side)		site	1	1,139	706	1,845
Bridge		site	7	3,006	1,002	4,008
1.3 Percut River Improvement	L = 28.0 km			20,348	8,729	29,077
Preparatory Works		L/S		1,850	794	2,644
Excavation		1000 m3	1,433	5,734	2,576	8,310
Embankment		1000 m3	370	3,798	1,799	5,597
Revetment		1000 m2	6	131	182	313
Weir		site	1	2,136	1,145	3,281
Sluiceway and Water Gate		site	5	1,571	524	2,095
Drain		site	56	495	165	660
Bridge		site	13	4,633	1,544	6,177
1.4 Lausimeme Dam				67,246	34,988	102,234
Preparatory Works		L/S		11,208	5,831	17,039
Excavation		1000 m3	150	654	329	983
Foundation Treatment (Grouting)		1000 m	6	678	222	900
Embankment		1000 m3	1,750	44,800	25,200	70,000
Concrete Works		1000 m3	20	6,000	2,000	8,000
Diversion Tunnel (Dia. 6 m)		m	500	3,063	1,313	4,376
Relocation Road		m	2,500	844	94	938
1.5 Padang River Improvement	L = 29.5 km			33,503	15,955	49,458
Preparatory Works		L/S		3,046	1,450	4,496
Excavation		1000 m3	3,422	13,695	6,153	19,848
Embankment		1000 m3	848	6,716	3,460	10,176
Revetment		1000 m2	23	499	882	1,381
Weir		site	1	3,616	2,033	5,649
Parapet Wall (Bahilang River)		m	600	540	180	720
Sluiceway		site	4	653	218	871
Drain		site	14	124	41	165
Bridge		site	6	4,614	1,538	6,152
Sub-total of 1.				178,254	100,705	278,959
2. Engineering Services				36,966	6,404	43,370
3. Compensation				0	34,226	34,226
4. Administration *1)				0	19,527	19,527
Sub-total of 2 to 4				36,966	60,157	97,123
5. Price Escalation *2)				0	92,470	92,470
6. Physical Contingency *3)				21,521	25,333	46,854
7. Value Added Tax *4)				0	51,541	51,541
Grand Total				236,741	330,206	566,947

Notes :
1) 7 % of 1. Construction Base Cost
2) Foreign Currency : 0 %, Local Currency 8 %
3) 10 % of 1 to 5
4) 10 % of 1 to 6

Table 5-2 ANNUAL DISBURSEMENT SCHEDULE FOR URGENT PROJECT

(Unit : Million Rp)

Description	Total			1993		1994		1995		1996		1997		1998		1999		2000	
	Total	F.C.	L.C.	F.C.	L.C.	F.C.	L.C.	F.C.	L.C.	F.C.	L.C.	F.C.	L.C.	F.C.	L.C.	F.C.	L.C.	F.C.	L.C.
1. CONSTRUCTION BASE COST	351,161	178,254	172,907	0	0	0	21,712	33,702	24,107	40,403	30,461	44,248	36,800	37,466	35,038	13,141	14,281	9,295	10,508
1.1 Deli River Improvement	76,839	43,924	32,915	0	0	0	0	6,800	5,086	6,800	5,086	10,645	7,691	10,645	7,691	6,440	4,983	2,595	2,378
1.2 Medan Floodway	21,351	13,233	8,118	0	0	0	0	3,308	2,030	3,308	2,030	3,308	2,030	3,308	2,030	0	0	0	0
1.3 Percut River Improvement	29,077	20,348	8,729	0	0	0	0	6,783	2,910	6,783	2,910	6,783	2,910	0	0	0	0	0	0
1.4 Lausimeme Dam	102,234	67,246	34,988	0	0	0	0	16,812	8,747	16,812	8,747	16,812	8,747	16,812	8,747	0	0	0	0
1.5 Padang River Improvement	49,458	33,503	15,955	0	0	0	0	0	0	6,701	3,191	6,701	3,191	6,701	3,191	6,701	3,191	6,701	3,191
1.6 Price Escalation; F.C. 0% & L.C. 8%	72,202	0	72,202	0	0	0	21,712	0	5,335	0	8,498	0	12,232	0	13,379	0	6,107	0	4,939
2. ENGINEERING SERVICES COST	45,503	36,966	8,537	9,309	1,625	11,090	2,284	3,849	993	2,544	620	2,544	669	2,544	723	2,544	781	2,544	843
2.1 Detailed Design	26,022	22,180	3,842	9,309	1,476	11,090	1,921	1,781	445	0	0	0	0	0	0	0	0	0	0
2.2 Construction Supervision	17,348	14,786	2,562	0	0	0	0	2,069	328	2,544	447	2,544	447	2,544	447	2,544	447	2,544	447
2.3 Price Escalation; F.C. 0% & L.C. 8%	2,133	0	2,133	0	149	0	363	0	220	0	173	0	222	0	276	0	334	0	396
3. COMPENSATION COST	42,636	0	42,636	0	0	0	16,456	0	26,181	0	0	0	0	0	0	0	0	0	0
3.1 House Evacuation & Land Acquisition	34,226	0	34,226	0	0	0	13,840	0	20,387	0	0	0	0	0	0	0	0	0	0
3.2 Price Escalation; F.C. 0% & L.C. 8%	8,410	0	8,410	0	0	0	2,616	0	5,794	0	0	0	0	0	0	0	0	0	0
4. ADMINISTRATION COST	29,252	0	29,252	0	0	0	0	0	4,717	0	6,055	0	7,215	0	6,695	0	2,607	0	1,963
4.1 Administration (7% of 1.1+1.2+1.3+1.4+1.5)	19,527	0	19,527	0	0	0	0	0	3,673	0	4,366	0	4,817	0	4,139	0	1,492	0	1,040
4.2 Price Escalation; F.C. 0% & L.C. 8%	9,725	0	9,725	0	0	0	0	0	1,044	0	1,689	0	2,398	0	2,556	0	1,115	0	923
5. TOTAL (1+2+3+4)	468,552	215,220	253,332	9,309	1,625	11,090	40,452	37,551	55,998	42,946	37,136	46,792	44,684	40,009	42,455	15,684	17,668	11,839	13,314
6. PHYSICAL CONTINGENCY	46,854	21,521	25,333	931	163	1,109	4,045	3,755	5,600	4,294	3,713	4,679	4,469	4,001	4,245	1,568	1,767	1,184	1,331
6.1 Physical Contingency: 10% of 1.	35,117	17,826	17,291	0	0	0	2,171	3,370	2,411	4,040	3,046	4,425	3,680	3,747	3,504	1,314	1,428	930	1,051
6.2 Physical Contingency: 10% of 2.	4,548	3,695	853	931	163	1,109	228	385	99	254	62	254	67	254	72	254	78	254	84
6.3 Physical Contingency: 10% of 3.	4,264	0	4,264	0	0	0	1,646	0	2,618	0	0	0	0	0	0	0	0	0	0
6.4 Physical Contingency: 10% of 4.	2,925	0	2,925	0	0	0	0	0	472	0	605	0	722	0	669	0	261	0	196
7. TOTAL (5+6)	515,406	236,741	278,665	10,240	1,788	12,199	44,497	41,306	61,598	47,240	40,849	51,471	49,153	44,010	46,700	17,252	19,435	13,023	14,645
8. VAT: 10% of 7.	51,541	0	51,541	0	1,203	0	5,670	0	10,290	0	8,809	0	10,062	0	9,071	0	3,669	0	2,767
9. GRAND TOTAL (7+8)	566,947	236,741	330,206	10,240	2,991	12,199	50,167	41,306	71,888	47,240	49,658	51,471	59,215	44,010	55,771	17,252	23,104	13,023	17,412

Price Level : September 1991
Conversion Rate : US$1.00 = Rp.1,950 = Yen136

Table 5-3 ANNUAL FLOW OF ECONOMIC COST AND BENEFIT FOR URGENT PROJECT

1. Deli-Percut River System (Urgent)

Unit : Million Rp

	Year	1.1 Integrated (30-Year)				1.2 Flood Control (30-Year)				1.3 Water Supply			
		Const.	OMR	Total	Economic Benefit	Const.	OMR	Total	Economic Benefit	Const.	OMR	Total	Economic Benefit
1	1993	11,701	0	11,701	0	6,969	0	6,969	0	4,732	0	4,732	0
2	1994	23,880	0	23,880	0	18,308	0	18,308	0	5,573	0	5,573	0
3	1995	73,129	0	73,129	0	46,942	0	46,942	0	26,711	0	26,711	0
4	1996	60,950	271	61,221	10,584	35,604	271	35,875	10,584	25,871	0	25,871	0
5	1997	68,102	477	68,579	18,611	42,756	477	43,233	18,611	25,871	0	25,871	0
6	1998	57,235	724	57,959	28,251	31,890	724	32,614	28,251	25,871	0	25,871	0
7	1999	15,218	1,601	16,819	43,670	14,165	908	15,073	35,441	0	715	715	8,229
8	2000	8,063	1,695	9,758	46,863	7,011	990	8,001	38,634	0	715	715	8,229
9	2001	0	1,745	1,745	48,444	0	1,030	1,030	40,215	0	715	715	8,229
10	2002	0	1,745	1,745	48,444	0	1,030	1,030	40,215	0	715	715	8,229
11	2003	0	1,745	1,745	50,717	0	1,030	1,030	40,215	0	715	715	10,502
12	2004	0	1,745	1,745	50,717	0	1,030	1,030	40,215	0	715	715	10,502
13	2005	0	1,745	1,745	50,717	0	1,030	1,030	40,215	0	715	715	10,502
14	2006	0	1,745	1,745	50,717	0	1,030	1,030	40,215	0	715	715	10,502
15	2007	0	1,745	1,745	50,717	0	1,030	1,030	40,215	0	715	715	10,502
16	2008	0	1,745	1,745	53,618	0	1,030	1,030	40,215	0	715	715	13,403
17	2009	0	1,745	1,745	53,618	0	1,030	1,030	40,215	0	715	715	13,403
18	2010	0	1,745	1,745	53,618	0	1,030	1,030	40,215	0	715	715	13,403
19	2011	0	1,745	1,745	53,618	0	1,030	1,030	40,215	0	715	715	13,403
20	2012	0	1,745	1,745	53,618	0	1,030	1,030	40,215	0	715	715	13,403
21	2013	0	1,745	1,745	57,322	0	1,030	1,030	40,215	0	715	715	17,107
22	2014	0	1,745	1,745	57,322	0	1,030	1,030	40,215	0	715	715	17,107
23	2015	0	1,745	1,745	57,322	0	1,030	1,030	40,215	0	715	715	17,107
24	2016	0	1,745	1,745	57,322	0	1,030	1,030	40,215	0	715	715	17,107
25	2017	0	1,745	1,745	57,322	0	1,030	1,030	40,215	0	715	715	17,107
26	2018	0	1,745	1,745	62,048	0	1,030	1,030	40,215	0	715	715	21,833
27	2019	0	1,745	1,745	62,048	0	1,030	1,030	40,215	0	715	715	21,833
28	2020	0	1,745	1,745	62,048	0	1,030	1,030	40,215	0	715	715	21,833
29	2021	0	1,745	1,745	62,048	0	1,030	1,030	40,215	0	715	715	21,833
30	2022	0	1,745	1,745	62,048	0	1,030	1,030	40,215	0	715	715	21,833
31	2023	0	1,745	1,745	68,080	0	1,030	1,030	40,215	0	715	715	27,865
32	2024	0	1,745	1,745	68,080	0	1,030	1,030	40,215	0	715	715	27,865
33	2025	0	1,745	1,745	68,080	0	1,030	1,030	40,215	0	715	715	27,865
34	2026	0	1,745	1,745	68,080	0	1,030	1,030	40,215	0	715	715	27,865
35	2027	0	1,745	1,745	68,080	0	1,030	1,030	40,215	0	715	715	27,865
36	2028	0	1,745	1,745	75,778	0	1,030	1,030	40,215	0	715	715	35,563
37	2029	0	1,745	1,745	75,778	0	1,030	1,030	40,215	0	715	715	35,563
38	2030	0	1,745	1,745	75,778	0	1,030	1,030	40,215	0	715	715	35,563
39	2031	0	1,745	1,745	75,778	0	1,030	1,030	40,215	0	715	715	35,563
40	2032	0	1,745	1,745	75,778	0	1,030	1,030	40,215	0	715	715	35,563
41	2033	0	1,745	1,745	85,604	0	1,030	1,030	40,215	0	715	715	45,389
42	2034	0	1,745	1,745	85,604	0	1,030	1,030	40,215	0	715	715	45,389
43	2035	0	1,745	1,745	85,604	0	1,030	1,030	40,215	0	715	715	45,389
44	2036	0	1,745	1,745	85,604	0	1,030	1,030	40,215	0	715	715	45,389
45	2037	0	1,745	1,745	85,604	0	1,030	1,030	40,215	0	715	715	45,389
46	2038	0	1,745	1,745	98,144	0	1,030	1,030	40,215	0	715	715	57,929
47	2039	0	1,745	1,745	98,144	0	1,030	1,030	40,215	0	715	715	57,929
48	2040	0	1,745	1,745	98,144	0	1,030	1,030	40,215	0	715	715	57,929
49	2041	0	1,745	1,745	98,144	0	1,030	1,030	40,215	0	715	715	57,929
50	2042	0	1,745	1,745	98,144	0	1,030	1,030	40,215	0	715	715	57,929
51	2043	0	1,745	1,745	114,149	0	1,030	1,030	40,215	0	715	715	73,934
52	2044	0	1,745	1,745	114,149	0	1,030	1,030	40,215	0	715	715	73,934
53	2045	0	1,745	1,745	114,149	0	1,030	1,030	40,215	0	715	715	73,934
54	2046	0	1,745	1,745	114,149	0	1,030	1,030	40,215	0	715	715	73,934
55	2047	0	1,745	1,745	114,149	0	1,030	1,030	40,215	0	715	715	73,934
56	2048	0	1,745	1,745	134,575	0	1,030	1,030	40,215	0	715	715	94,360
57	2049	0	1,745	1,745	40,215	0	1,030	1,030	40,215	0	0	0	0
58	2050	0	1,745	1,745	40,215	0	1,030	1,030	40,215	0	0	0	0
59	2051	0	0	0	0	0	0	0	0	0	0	0	0
60	2052	0	0	0	0	0	0	0	0	0	0	0	0
61	2053	0	0	0	0	0	0	0	0	0	0	0	0
62	2054	0	0	0	0	0	0	0	0	0	0	0	0
63	2055	0	0	0	0	0	0	0	0	0	0	0	0
64	2056	0	0	0	0	0	0	0	0	0	0	0	0
65	2057	0	0	0	0	0	0	0	0	0	0	0	0
66	2058	0	0	0	0	0	0	0	0	0	0	0	0
67	2059	0	0	0	0	0	0	0	0	0	0	0	0
68													
69													
70	Total	318,278	92,018	410,296	3,787,171	203,645	54,869	258,514	2,142,270	114,629	35,750	150,379	1,644,901

2. Padang River (Urgent)

Unit : Million Rp

	Year	Flood Control (10-Year)			
		Const.	OMR	Total	Economic Benefit
1	1993	0	0	0	0
2	1994	0	0	0	0
3	1995	0	0	0	0
4	1996	2,399	0	2,399	0
5	1997	8,160	0	8,160	0
6	1998	19,477	0	19,477	0
7	1999	19,477	135	19,612	2,987
8	2000	19,477	269	19,746	5,974
9	2001	0	404	404	8,961
10	2002	0	404	404	8,961
11	2003	0	404	404	8,961
12	2004	0	404	404	8,961
13	2005	0	404	404	8,961
14	2006	0	404	404	8,961
15	2007	0	404	404	8,961
16	2008	0	404	404	8,961
17	2009	0	404	404	8,961
18	2010	0	404	404	8,961
19	2011	0	404	404	8,961
20	2012	0	404	404	8,961
21	2013	0	404	404	8,961
22	2014	0	404	404	8,961
23	2015	0	404	404	8,961
24	2016	0	404	404	8,961
25	2017	0	404	404	8,961
26	2018	0	404	404	8,961
27	2019	0	404	404	8,961
28	2020	0	404	404	8,961
29	2021	0	404	404	8,961
30	2022	0	404	404	8,961
31	2023	0	404	404	8,961
32	2024	0	404	404	8,961
33	2025	0	404	404	8,961
34	2026	0	404	404	8,961
35	2027	0	404	404	8,961
36	2028	0	404	404	8,961
37	2029	0	404	404	8,961
38	2030	0	404	404	8,961
39	2031	0	404	404	8,961
40	2032	0	404	404	8,961
41	2033	0	404	404	8,961
42	2034	0	404	404	8,961
43	2035	0	404	404	8,961
44	2036	0	404	404	8,961
45	2037	0	404	404	8,961
46	2038	0	404	404	8,961
47	2039	0	404	404	8,961
48	2040	0	404	404	8,961
49	2041	0	404	404	8,961
50	2042	0	404	404	8,961
51	2043	0	404	404	8,961
52	2044	0	404	404	8,961
53	2045	0	404	404	8,961
54	2046	0	404	404	8,961
55	2047	0	404	404	8,961
56	2048	0	404	404	8,961
57	2049	0	404	404	8,961
58	2050	0	404	404	8,961
59	2051	0	0	0	0
60	2052	0	0	0	0
61	2053	0	0	0	0
62	2054	0	0	0	0
63	2055	0	0	0	0
64	2056	0	0	0	0
65	2057	0	0	0	0
66	2058	0	0	0	0
67	2059	0	0	0	0
68					
69					
70	Total	68,990	20,604	89,594	457,011

Table 5-4 RESULTS OF ECONOMIC ANALYSIS FOR URGENT PROJECT

Evaluation Items		1. Deli-Percut River System			2. Padang River
		Integrated 30-year	Flood Control 30-year	Water Supply	Flood Control 10-Year
IRR (%)		14.35	17.90	9.90	11.86
NPV (Million Rp)					
Discount	12 %	46,596	66,530	(20,315)	(404)
Rate	10 %	113,286	114,227	(1,295)	6,923
	8 %	226,082	189,914	35,859	19,825
	5 %	588,307	412,244	175,899	61,695
	1 %	2,311,513	1,343,415	968,821	253,095
B/C					
Discount	12 %	1.23	1.51	0.73	0.99
Rate	10 %	1.51	1.80	0.98	1.18
	8 %	1.93	2.22	1.40	1.45
	5 %	3.08	3.29	2.70	2.12
	1 %	7.21	6.71	8.11	4.18

Note: ( ) means a negative value.

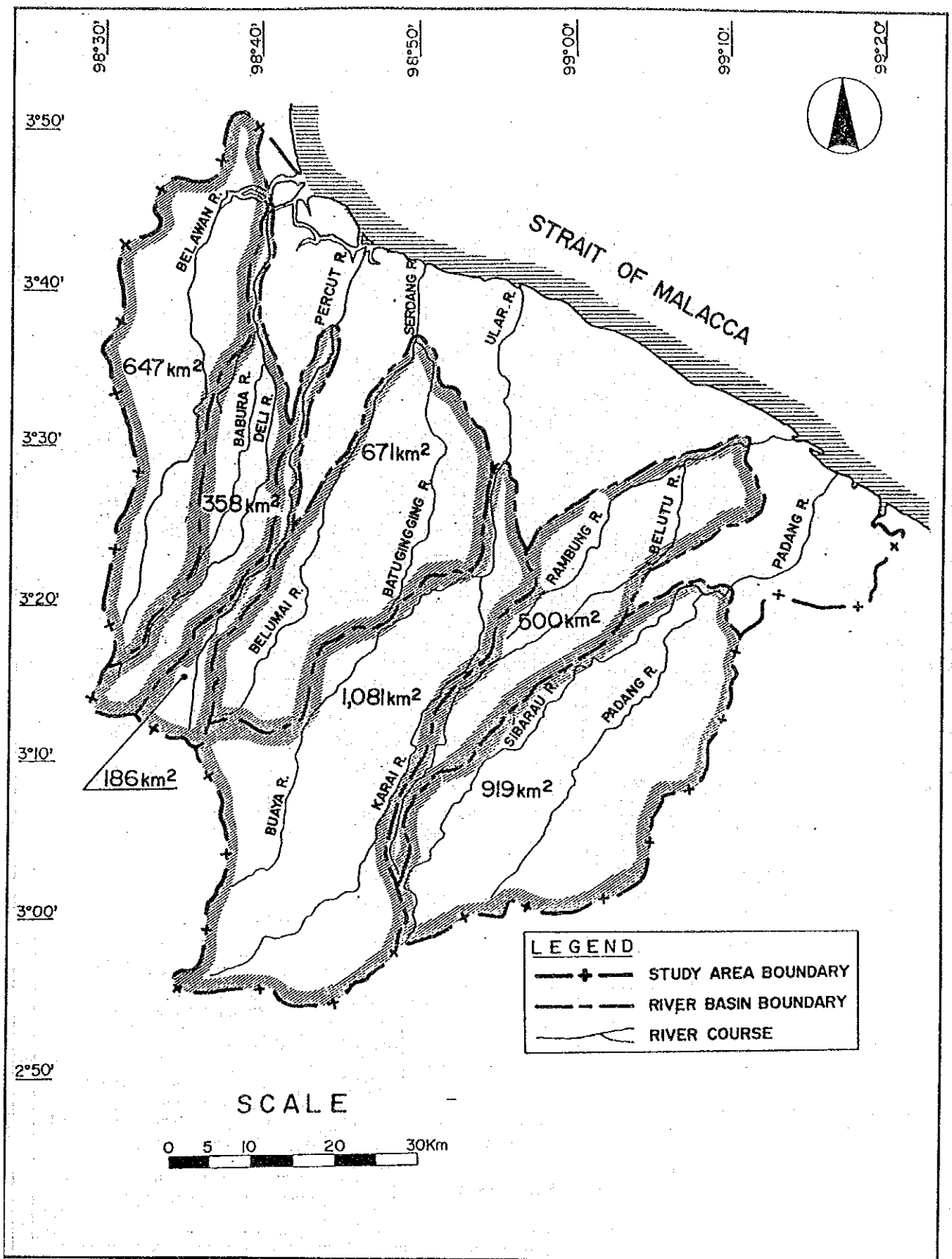
Table 5-5 SENSITIVITY TEST OF EIRR

(Unit : %)

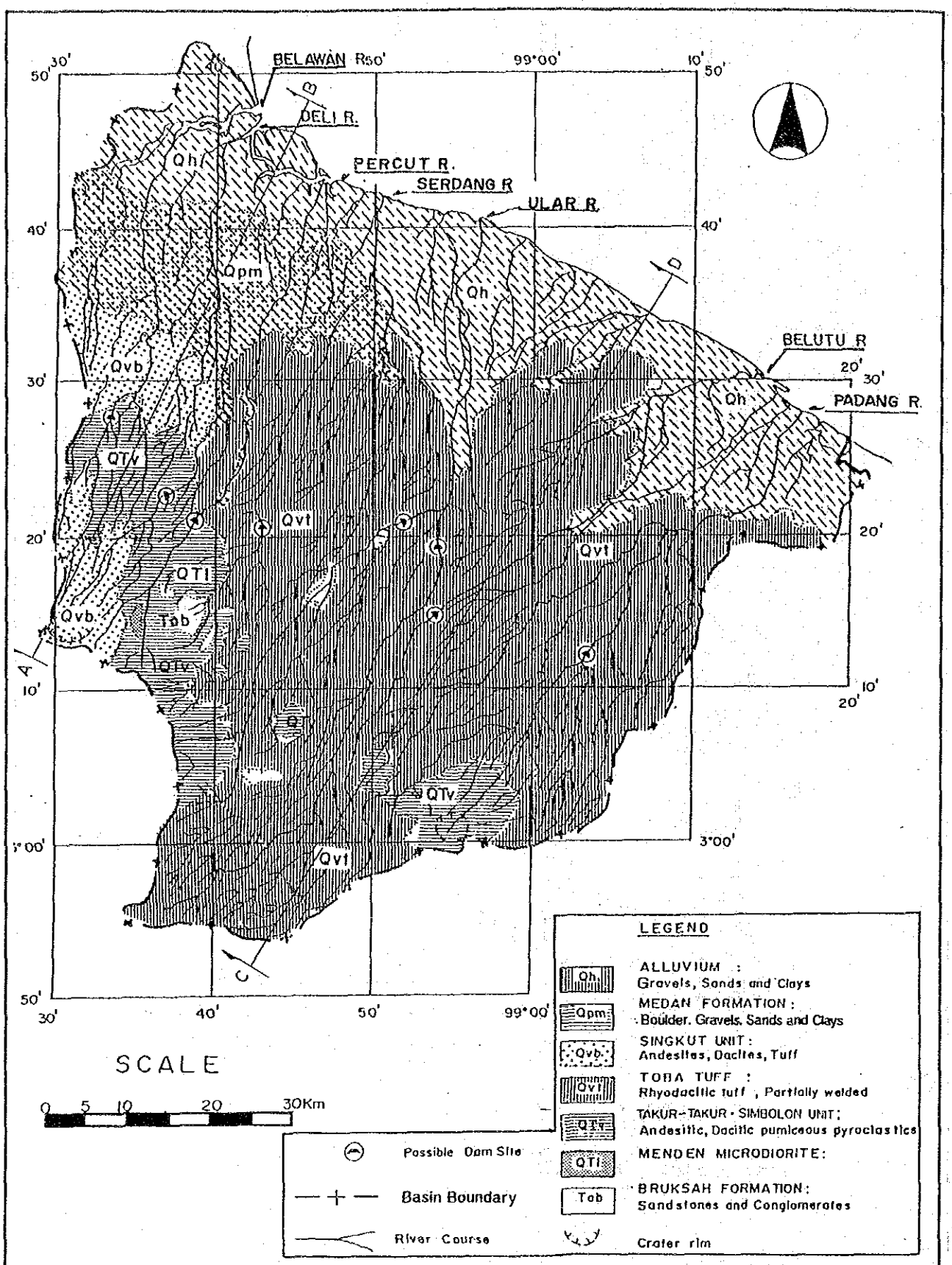
Item		Deli-Percut			Padang
		Integrated	Flood Control	Water Supply	Flood Control
Increase	+ 5 %	13.75	17.08	9.60	11.28
in Cost	+10 %	13.20	16.34	9.34	10.75
Decrease	- 5 %	13.72	17.04	9.59	11.25
in Benefit	-10 %	13.08	16.18	9.28	10.63

FIGURES

50
9
5/1



THE STUDY ON BELAWAN-PADANG INTEGRATED RIVER BASIN DEVELOPMENT IN THE REPUBLIC OF INDONESIA	RIVER AND RIVER BASIN
JAPAN INTERNATIONAL COOPERATION AGENCY	Fig.2-1

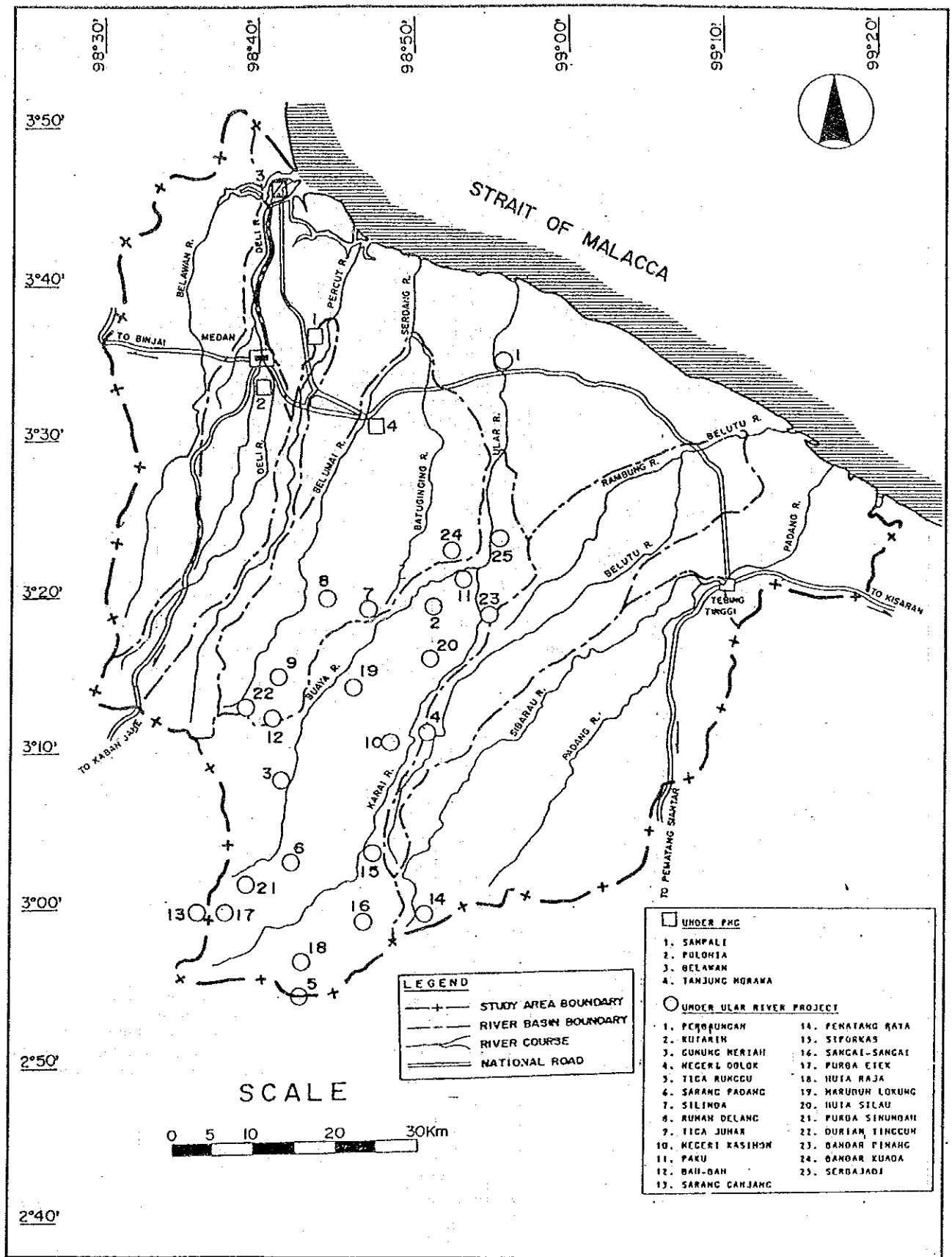


THE STUDY ON BELAWAN-PADANG INTEGRATED RIVER BASIN DEVELOPMENT IN THE REPUBLIC OF INDONESIA

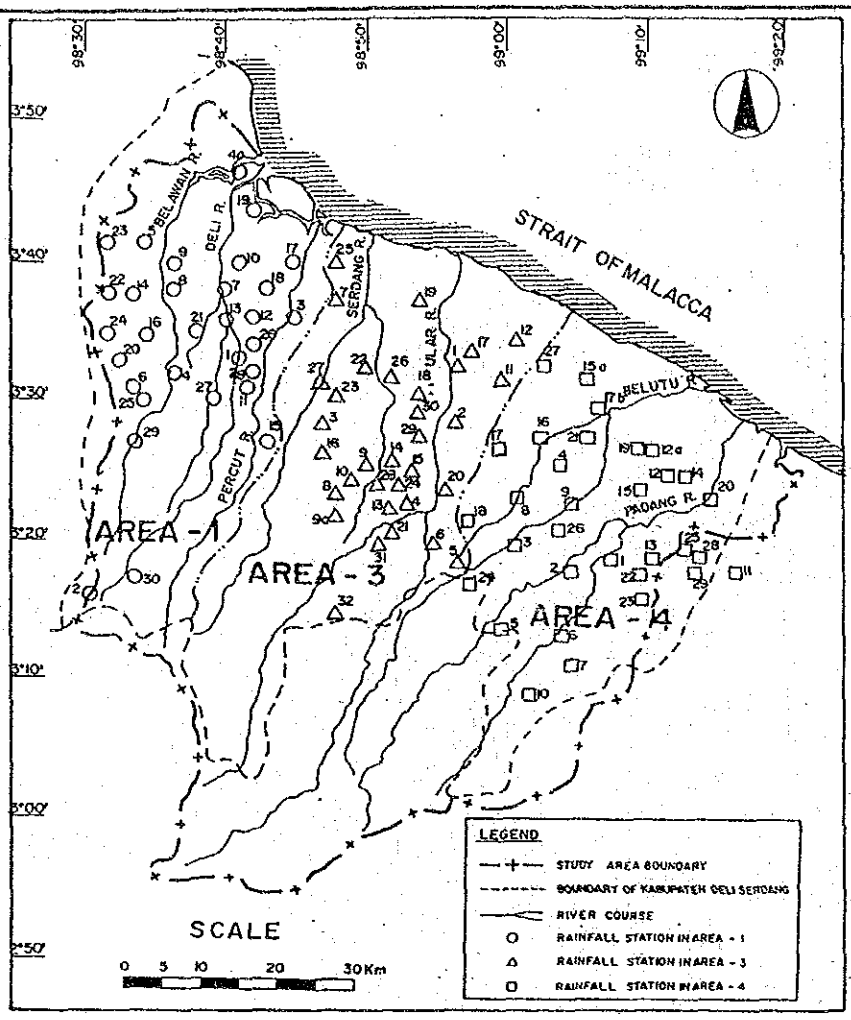
JAPAN INTERNATIONAL COOPERATION AGENCY

GEOLOGICAL MAP OF STUDY AREA

Fig.2-2



THE STUDY ON BELAWAN-PADANG INTEGRATED RIVER BASIN DEVELOPMENT IN THE REPUBLIC OF INDONESIA JAPAN INTERNATIONAL COOPERATION AGENCY	LOCATION OF RAINFALL STATIONS UNDER PMG AND ULAR RIVER PROJECT Fig.2-3



AREA - 1

1. D.P.P.H /3
2. DANDAR DARU /4
3. DANDAR KLIPPA
4. DELAWAN ESTATE /4
4a. BELAWAN (PORT.) /4
5. DULU CINA
6. GLUGUR
7. HELVETIA
8. KLANDIR LINA
9. KLUMPANG
10. MADAR
11. MARIENDAL
12. MEDAN ESTATE
13. MEDAN PUTRI /2
14. PAYA DAKONG
15. PATUMDAK
16. SEI SEMAYANG A.
17. SACRIS
18. SAMPALI
19. SERUNAI
20. SEI MENCIRIM /4
21. SEI SIKAMBING DINAS TRACTOR
22. TANDEM
23. TANDEM HILIR
24. TIMBANG LANGKAT
25. TUNTUNGAN /4 RAKYAT MEDAN
27. SEI SIKAMBING KIM. PNP. III
28. MARIENDAL COKLAT
29. GLUGUR MIMBUR
30. DANDAR DARU /3 (DAIRY)

AREA - 3

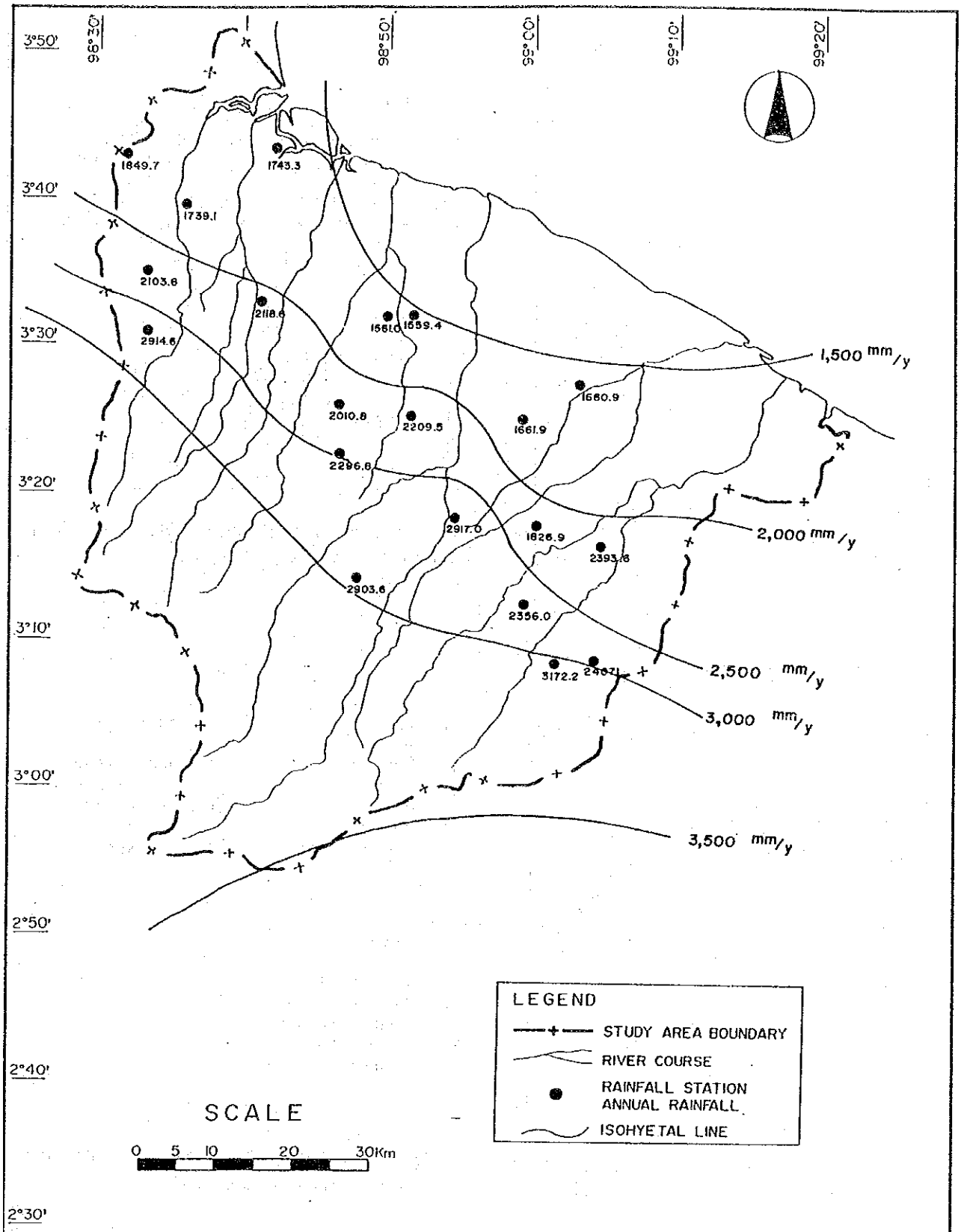
1. ADOLINA HILIR /3
2. ADOLINA ULU
3. AEK PANCUR
4. DANDAR KWALA
5. DANDAR NEGERI
6. DANDAR PINANG
6. DATANG KWIS
8. DATU GINGGING
9. DATU BATA
9a. DANGUN PURBA
10. DEGERPANG
11. DENGADING
12. DELI MUDA
13. GREMIAN
14. SEI KARANG
15. KWALA NAMU
16. LINAU MUNGKUR
17. MELATI
18. PAGAR MARDAU
19. RAMUNIA /4
20. SERDAJADI
21. SEI KARI
22. SEI MERAU
23. SEI PANCUR /4
24. SEI PUTIH
25. SEI TUAN /4
26. TANJONG GARBUS
27. TANJONG MERAWA KANAN
28. TANJONG PURBA
29. TIMBANG DELI
30. TANAH ADANG
31. KOTARI
32. SILINDA

AREA - 4

1. BANILANG
2. DANDAR DEJAMBU
3. DANGUN DANDAR /3
4. SINA KASIH
5. GUNUNG MONAKO
6. GUNUNG PAMELA
7. GUNUNG PARA
8. MENGA EST.
9. MATA PAO
10. NAGA RAJA
11. PADATU /2
12. PAYA MADAR
12a. SEI BULUH
13. PAYA PINANG
14. PRIOK
15. RAMBUTAN
15a RAMBUTAN AFD.V LIBERIA
16. RAMBONG EST.
17. RAMBONG SIALANG
17b. RAMBONG SIALANG DIV.V FIRDAUS
18. SARANG GINEING
19. SEI DAMDAM
20. SEI BIRUNG
21. SEI PARIT
22. SEI RAMPAH
23. SEI BULAN
24. SILAU DUNIA
25. TANAH DESIH
26. TANJUNG MANIA
27. TANAH RAJA
28. BATNA (EX MENDARIS B)
29. MENDARIS A

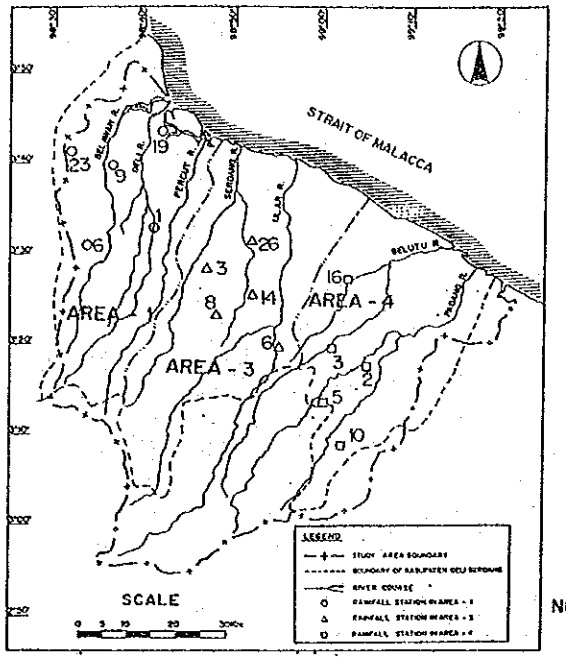
NOTE : /1 With observation of solar radiation and temperature
/2 With observation of solar radiation
/3 With observation of temperature
/4 Observation of rainfall interrupted

THE STUDY ON BELAWAN-PADANG INTEGRATED RIVER BASIN DEVELOPMENT IN THE REPUBLIC OF INDONESIA	LOCATION OF RAINFALL STATIONS UNDER RISPA
JAPAN INTERNATIONAL COOPERATION AGENCY	Fig.2-4



THE STUDY ON BELAWAN-PADANG INTEGRATED RIVER BASIN DEVELOPMENT IN THE REPUBLIC OF INDONESIA	ISOHYETAL MAP OF ANNUAL RAINFALL
JAPAN INTERNATIONAL COOPERATION AGENCY	Fig.2-5

1954 - 1968 (15 STATION)



AREA - 1

1. B.P.P.M /1
6. GLUGUR
9. KLUMPANG
19. SERUWAI
23. TANDEM HILIR

AREA - 3

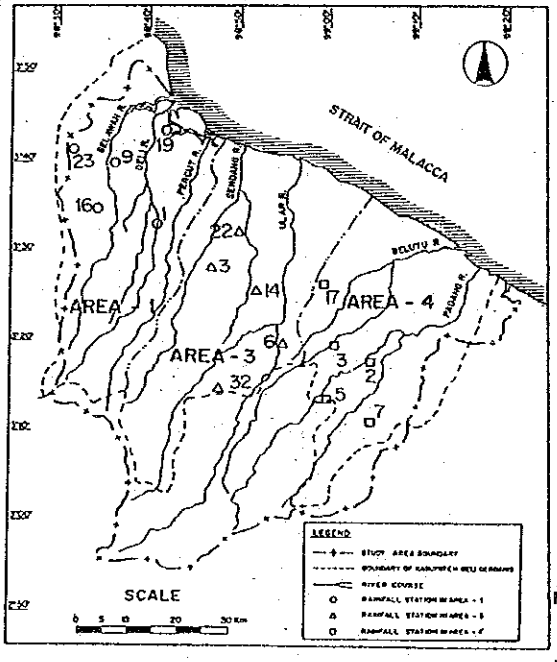
3. AEK PANCUR
6. BANDAR PINANG
8. BATU GINGGING
14. SEI KARANG
26. TANJONG GARBUS

AREA - 4

2. BANDAR BEJAMBU
3. BANGUN BANDAR /2
5. GUNUNG MONAKO
10. NAGA RAJA
16. RAMBONG EST.

NOTE /1 WITH OBSERVATION OF SOLAR RADIATION AND TEMPERATURE
/2 WITH OBSERVATION OF TEMPERATURE

1969 - 1988 (15 STATION)



AREA - 1

1. B.P.P.M /1
9. KLUMPANG
16. SEI SEMAYANG A.
19. SERUWAI
23. TANDEM HILIR

AREA - 3

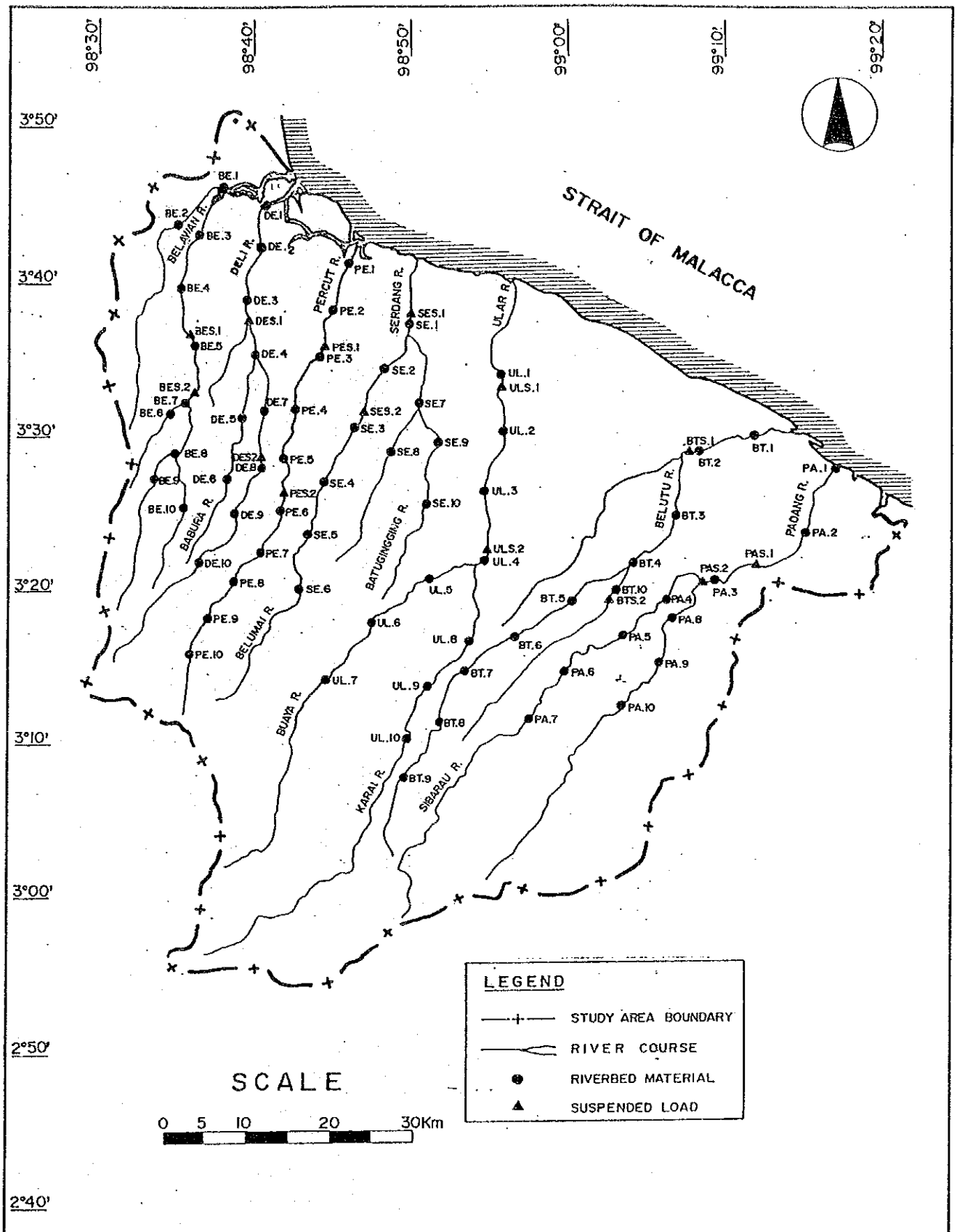
3. AEK PANCUR
6. BANDAR PINANG
14. SEI KARANG
22. SEI MERAH
32. SILINDA

AREA - 4

2. BANDAR BEJAMBU
3. BANGUN BANDAR /2
5. GUNUNG MONAKO
7. GUNUNG PARA
17. RAMBONG SIALANG

NOTE /1 WITH OBSERVATION OF SOLAR RADIATION AND TEMPERATURE
/2 WITH OBSERVATION OF TEMPERATURE

THE STUDY ON BELAWAN-PADANG INTEGRATED RIVER BASIN DEVELOPMENT IN THE REPUBLIC OF INDONESIA	LOCATION OF REPRESENTATIVE RAINFALL STATIONS
JAPAN INTERNATIONAL COOPERATION AGENCY	Fig.2-6

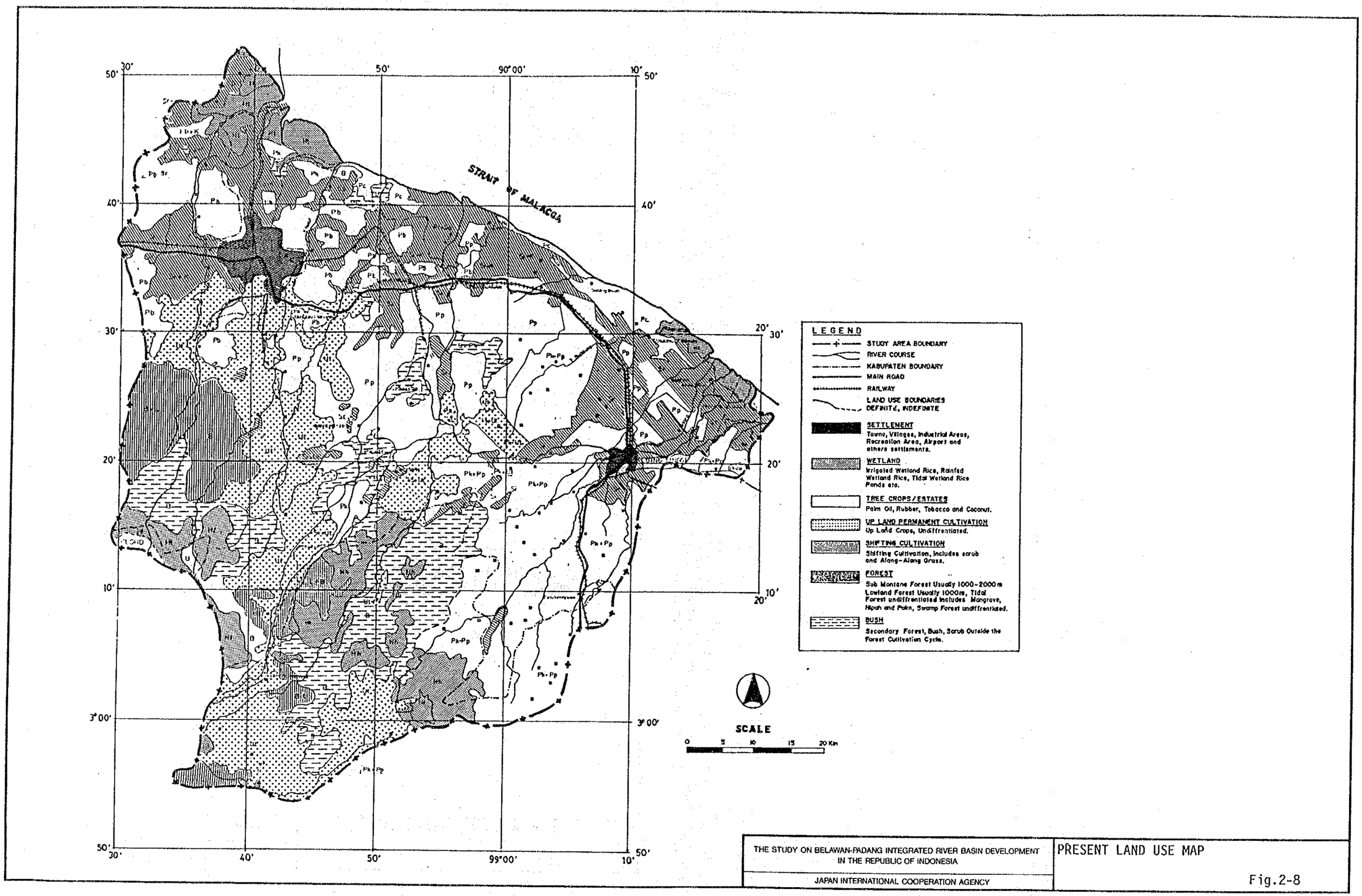


THE STUDY ON BELAWAN-PADANG INTEGRATED RIVER BASIN DEVELOPMENT IN THE REPUBLIC OF INDONESIA

JAPAN INTERNATIONAL COOPERATION AGENCY

SAMPLING SITES OF RIVERBED MATERIAL AND SUSPENDED LOAD SURVEY

Fig.2-7

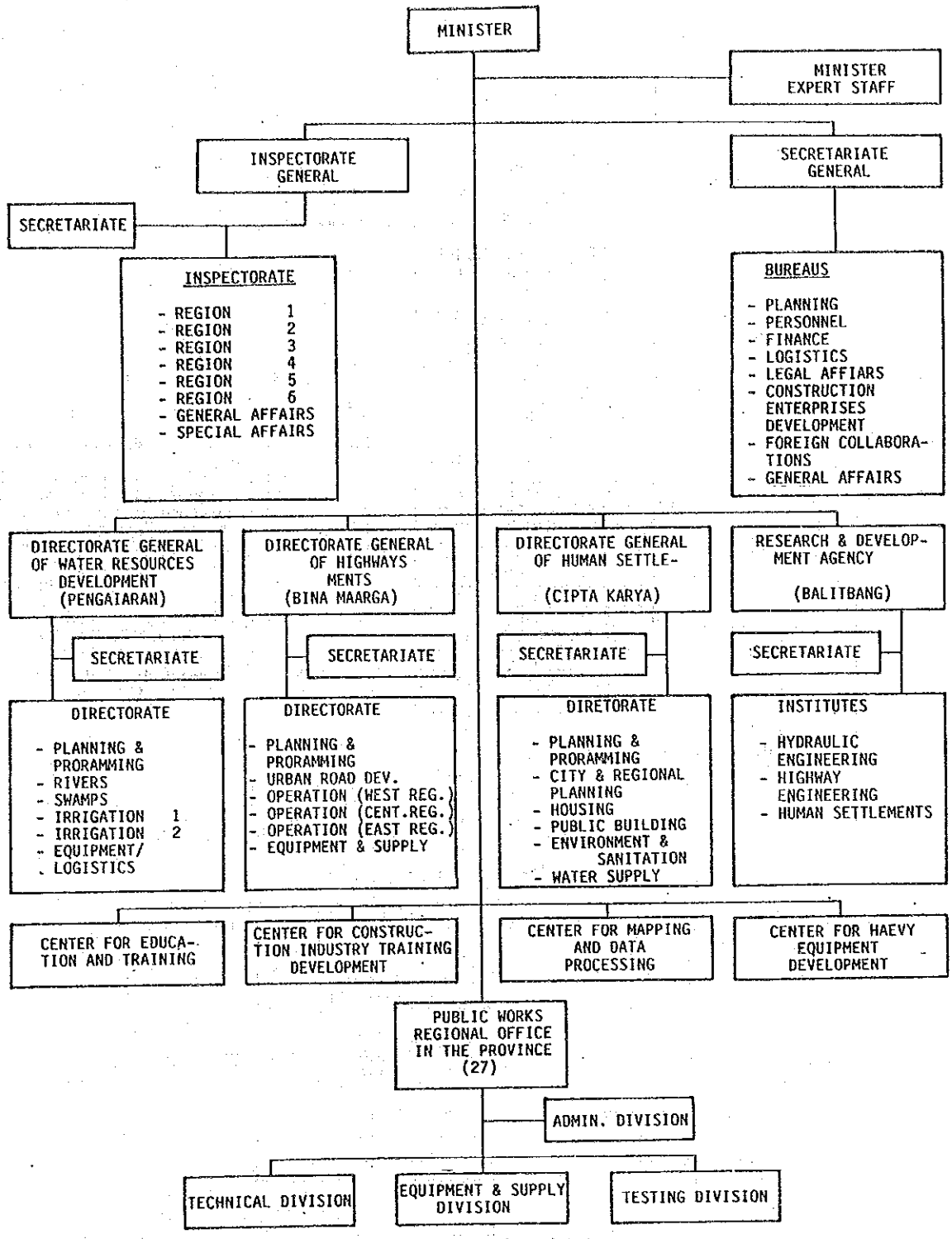


THE STUDY ON BELAWAN-PADANG INTEGRATED RIVER BASIN DEVELOPMENT IN THE REPUBLIC OF INDONESIA

JAPAN INTERNATIONAL COOPERATION AGENCY

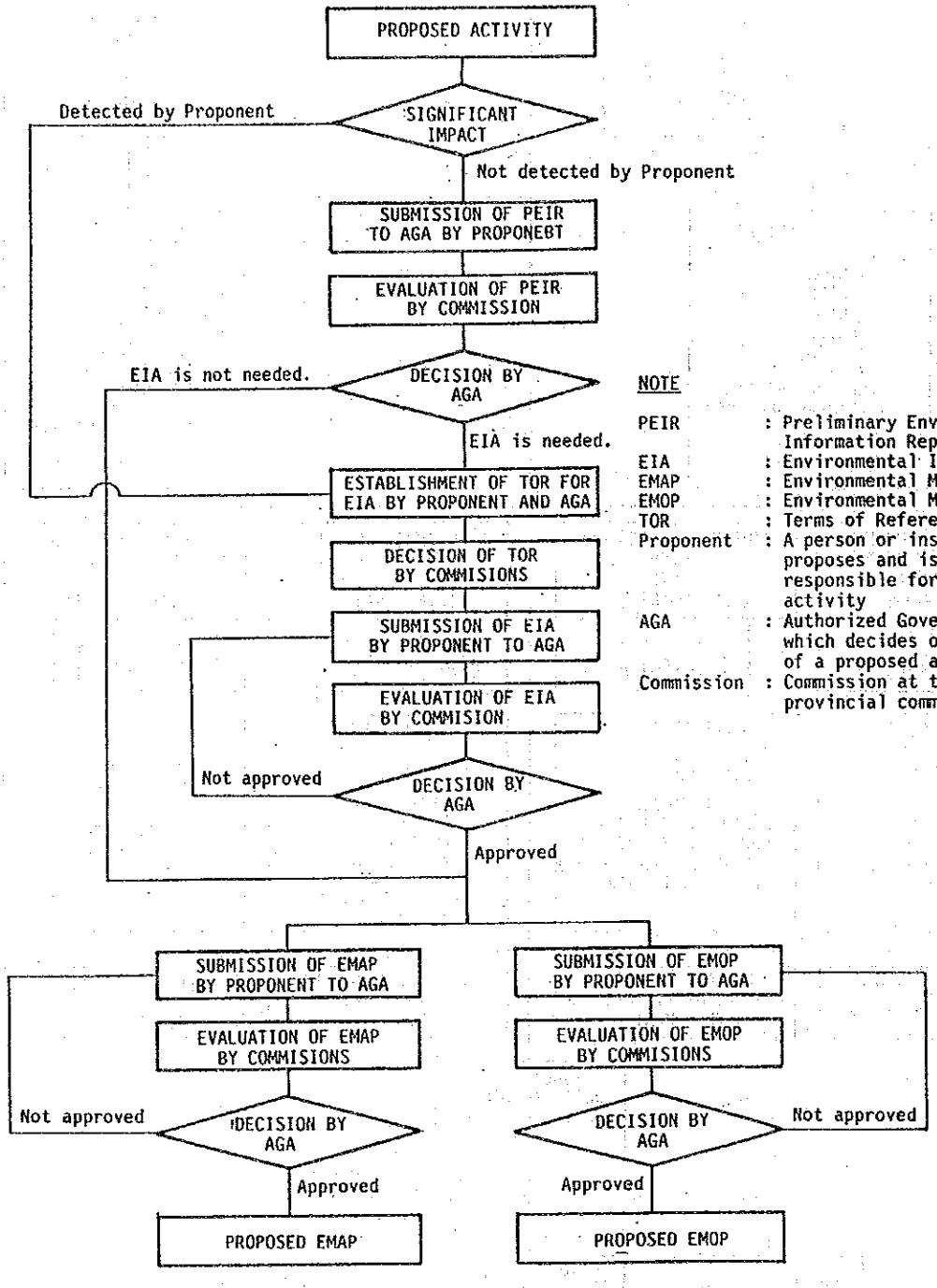
PRESENT LAND USE MAP

Fig.2-8



Source : Decree of the Minister of Public Works No. 211/KPIS/1984
(Organization Structure and Work System of MPW)

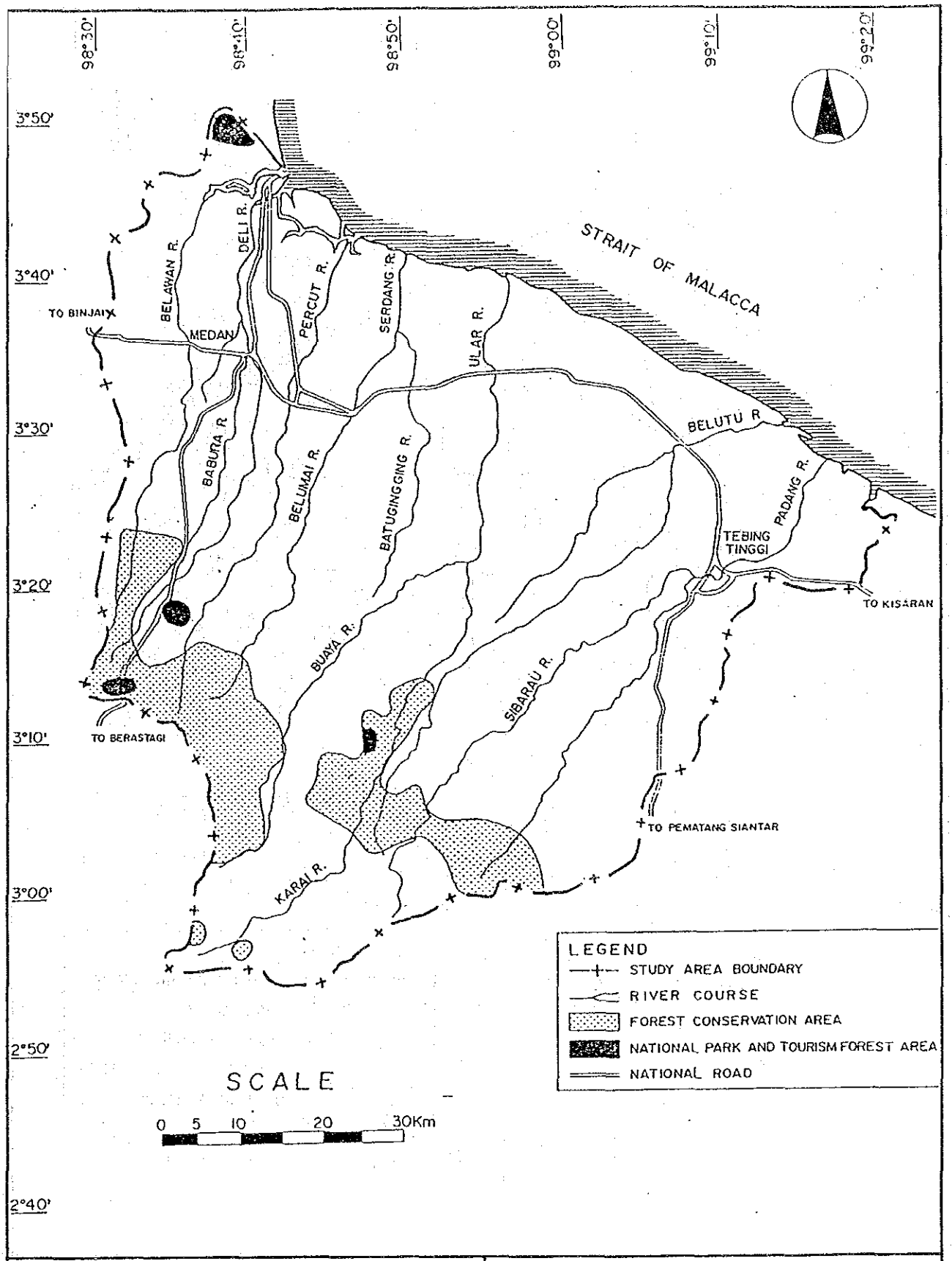
THE STUDY ON BELAWAN-PADANG INTEGRATED RIVER BASIN DEVELOPMENT IN THE REPUBLIC OF INDONESIA	ORGANIZATIONAL STRUCTURE OF MPW
JAPAN INTERNATIONAL COOPERATION AGENCY	Fig.2-9



NOTE

PEIR	: Preliminary Environmental Information Report
EIA	: Environmental Impact Analysis
EMAP	: Environmental Management Plan
EMOP	: Environmental Monitoring Plan
TOR	: Terms of Reference
Proponent	: A person or institution who proposes and is hold responsible for a proposed activity
AGA	: Authorized Government Agency which decides on implementaition of a proposed activity
Commission	: Commission at the capital and provincial commission

THE STUDY ON BELAWAN-PADANG INTEGRATED RIVER BASIN DEVELOPMENT IN THE REPUBLIC OF INDONESIA	GOVERNMENT ENVIRONMENTAL IMPACT ASSESSMENT PROCEDURE
JAPAN INTERNATIONAL COOPERATION AGENCY	Fig.2-10

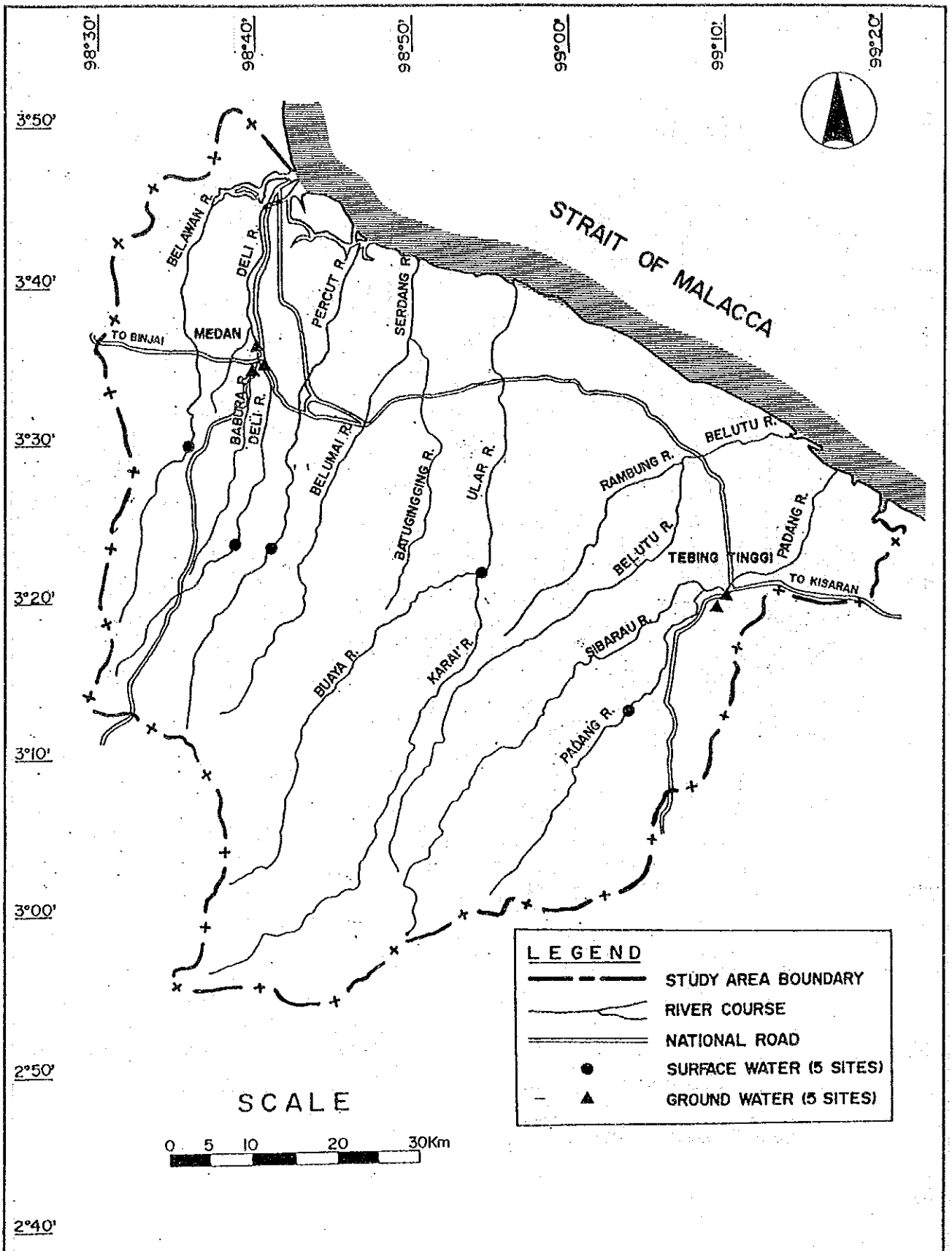


THE STUDY ON BELAWAN-PADANG INTEGRATED RIVER BASIN DEVELOPMENT IN THE REPUBLIC OF INDONESIA

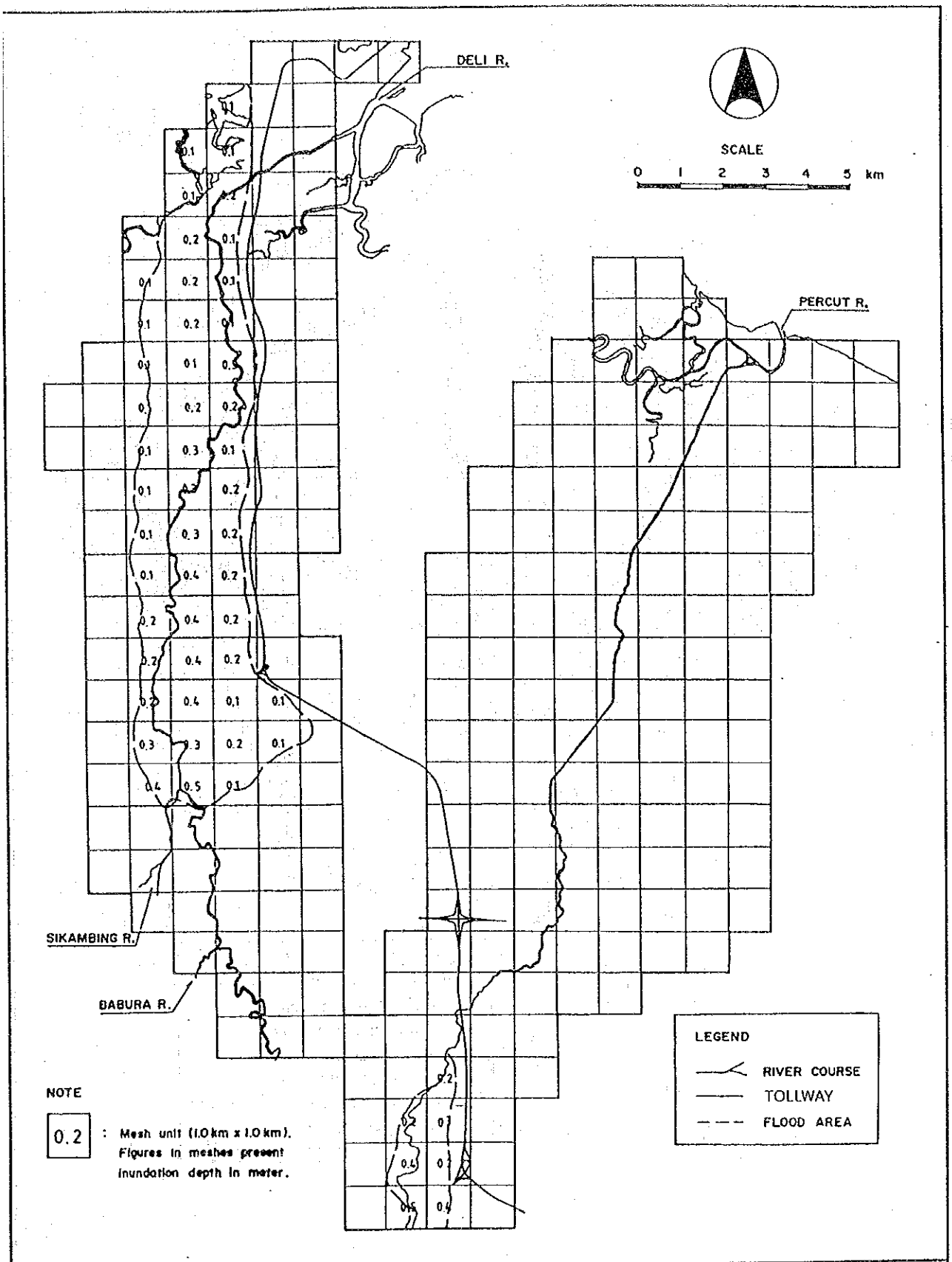
JAPAN INTERNATIONAL COOPERATION AGENCY

NATURE CONSERVATION AREA

Fig.2-11



THE STUDY ON BELAWAN-PADANG INTEGRATED RIVER BASIN DEVELOPMENT IN THE REPUBLIC OF INDONESIA	WATER SAMPLING SITES
JAPAN INTERNATIONAL COOPERATION AGENCY	Fig.2-12

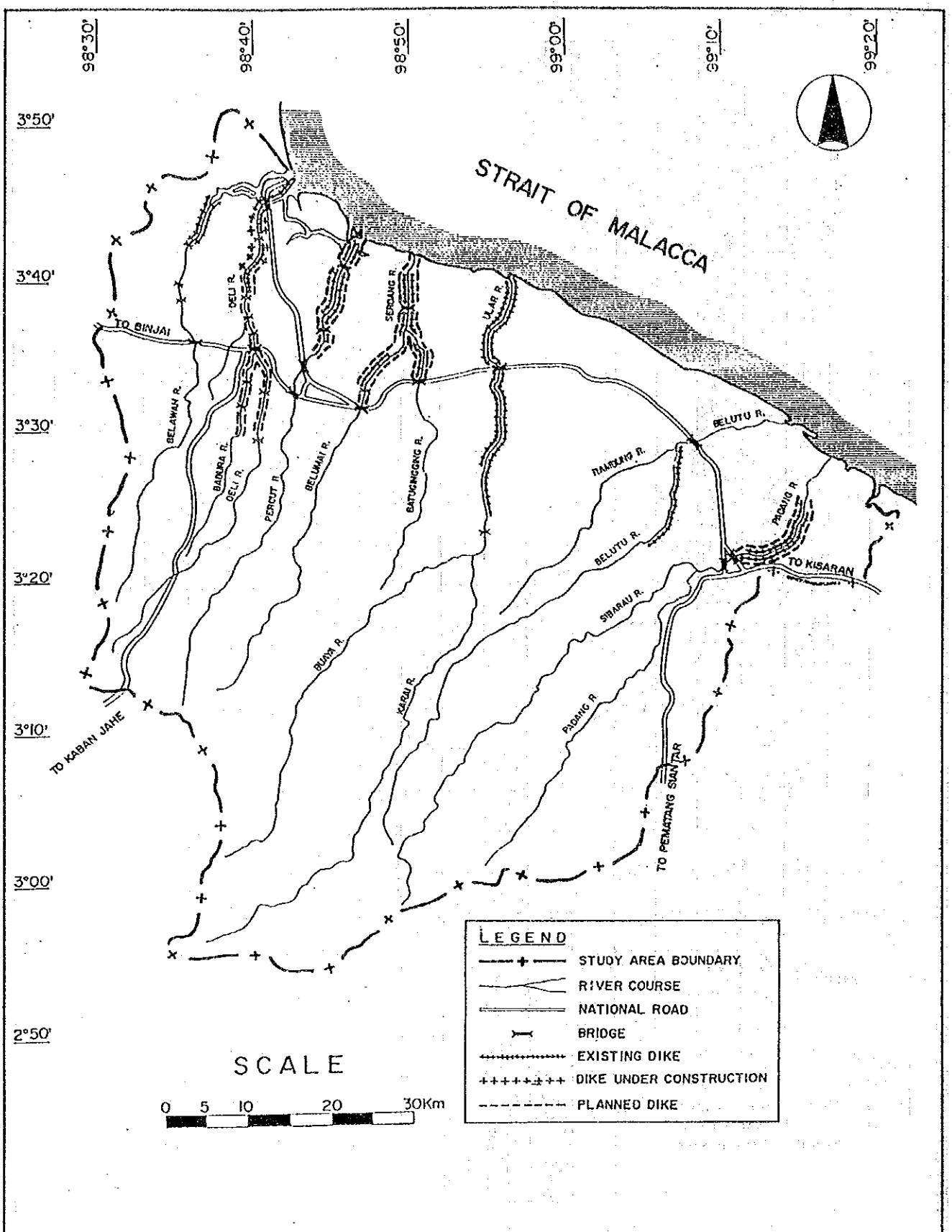


THE STUDY ON BELAWAN-PADANG INTEGRATED RIVER BASIN DEVELOPMENT IN THE REPUBLIC OF INDONESIA

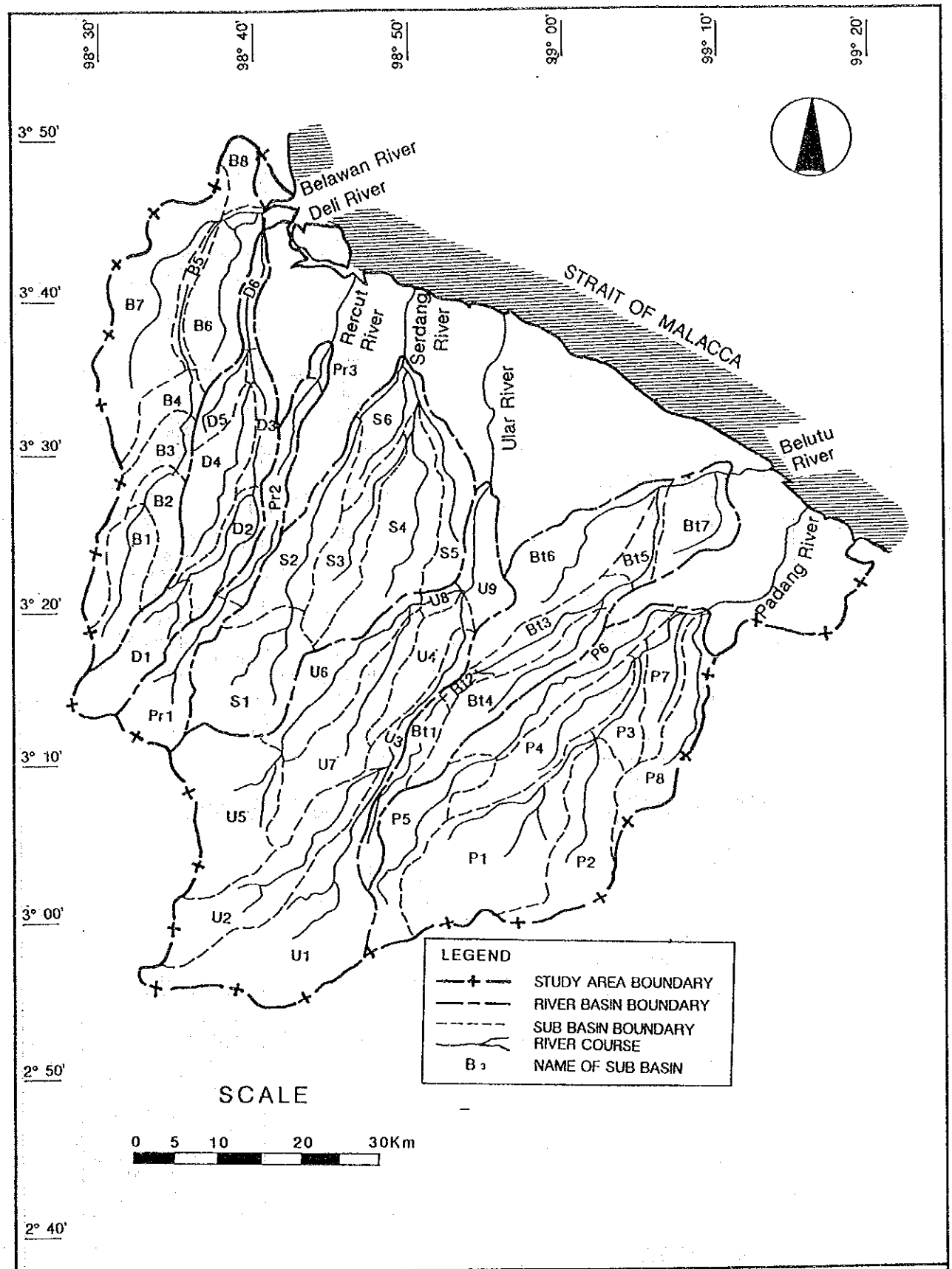
JAPAN INTERNATIONAL COOPERATION AGENCY

INUNDATION AREA OF NOVEMBER 1990 FLOOD

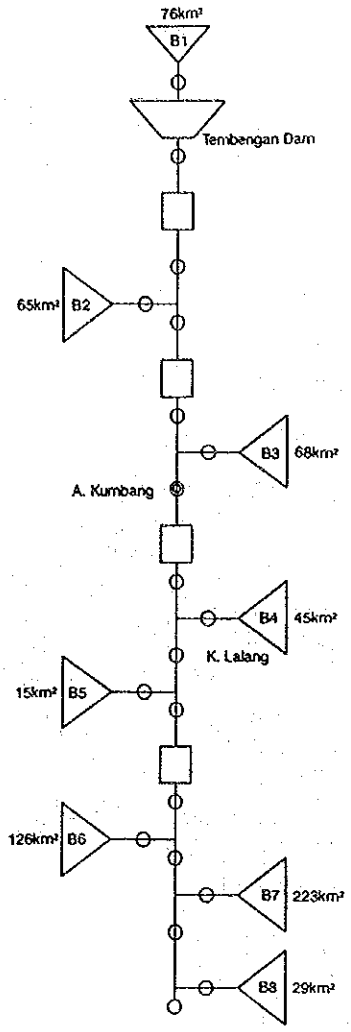
Fig.3-1



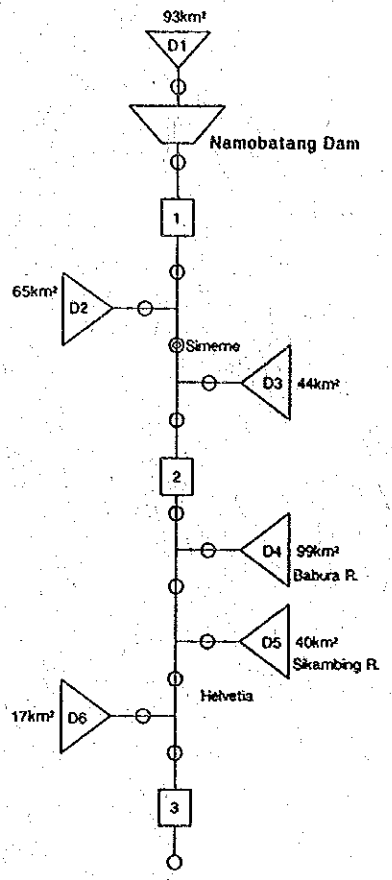
THE STUDY ON BELAWAN-PADANG INTEGRATED RIVER BASIN DEVELOPMENT IN THE REPUBLIC OF INDONESIA JAPAN INTERNATIONAL COOPERATION AGENCY	LOCATION OF EXISTING AND PLANNED RIVER DIKES Fig.3-2



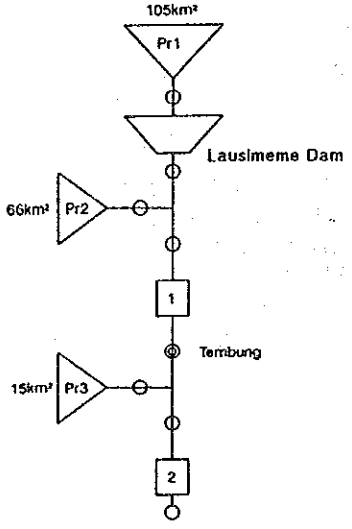
THE STUDY ON BELAWAN-PADANG INTEGRATED RIVER BASIN DEVELOPMENT IN THE REPUBLIC OF INDONESIA	SUBBASIN DIVISION
JAPAN INTERNATIONAL COOPERATION AGENCY	Fig.3-3



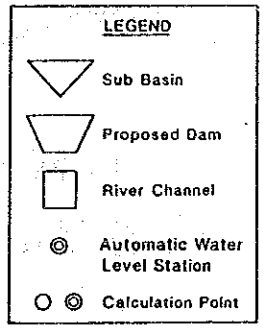
BELAWAN R. MODEL



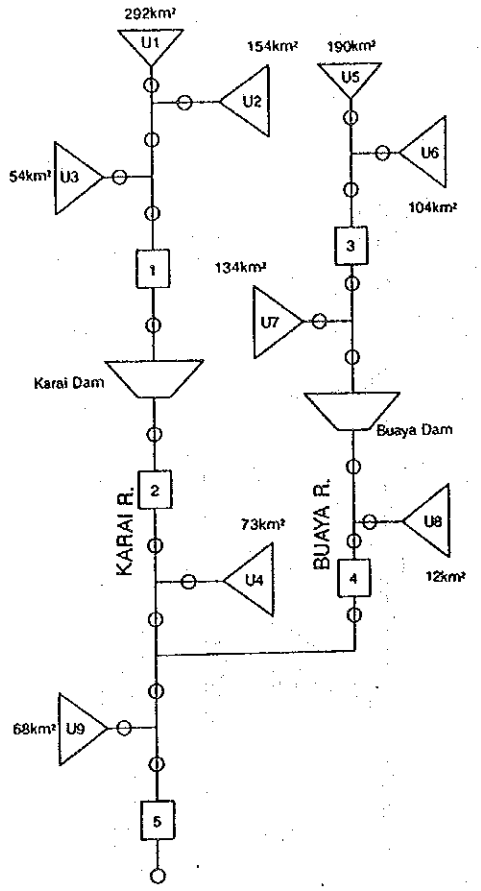
DELI R. MODEL



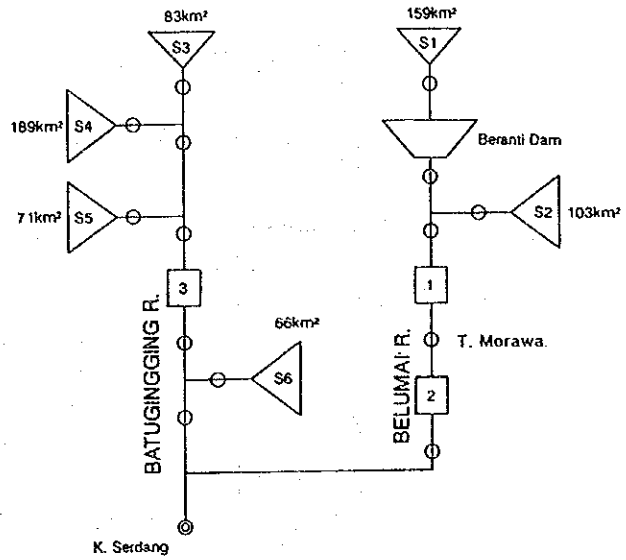
PERCUT R. MODEL



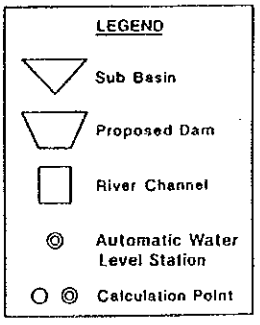
THE STUDY ON BELAWAN-PADANG INTEGRATED RIVER BASIN DEVELOPMENT IN THE REPUBLIC OF INDONESIA	BASIN RUNOFF MODEL
JAPAN INTERNATIONAL COOPERATION AGENCY	Fig.3-4(1/3)



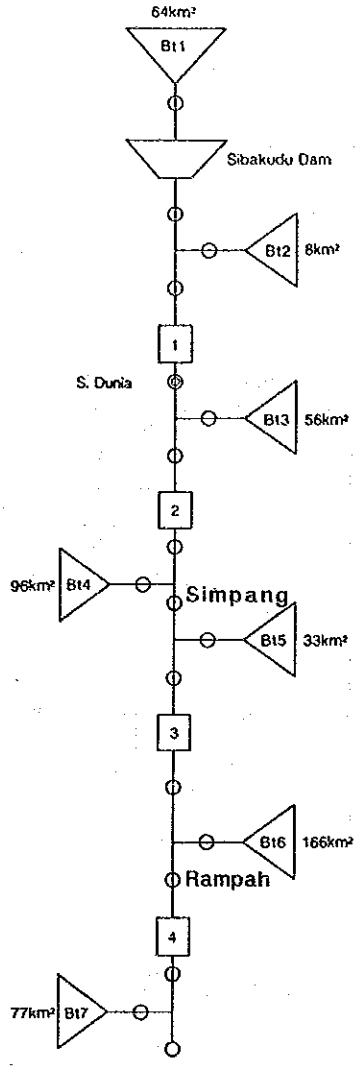
ULAR R. MODEL



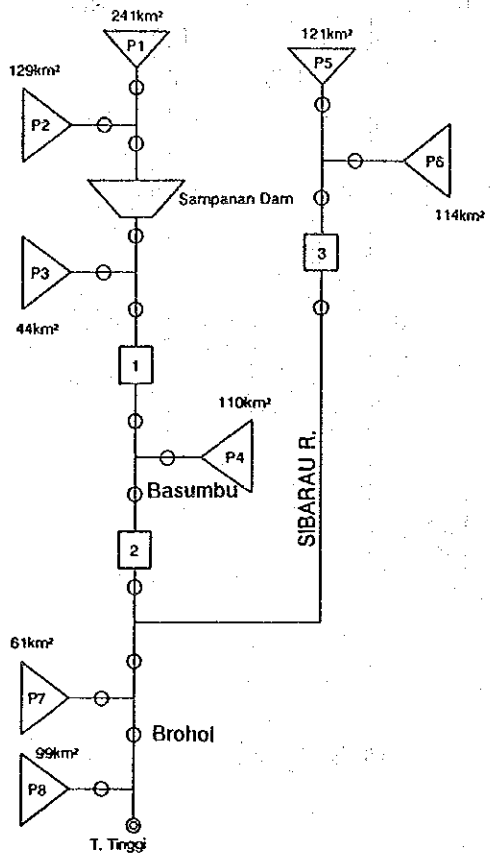
SERDANG R. MODEL



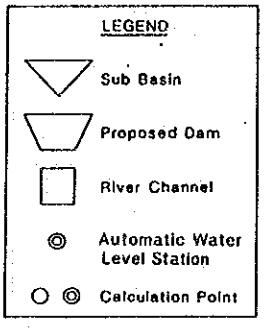
THE STUDY ON BELAWAN-PADANG INTEGRATED RIVER BASIN DEVELOPMENT IN THE REPUBLIC OF INDONESIA	BASIN RUNOFF MODEL
JAPAN INTERNATIONAL COOPERATION AGENCY	Fig.3-4(2/3)



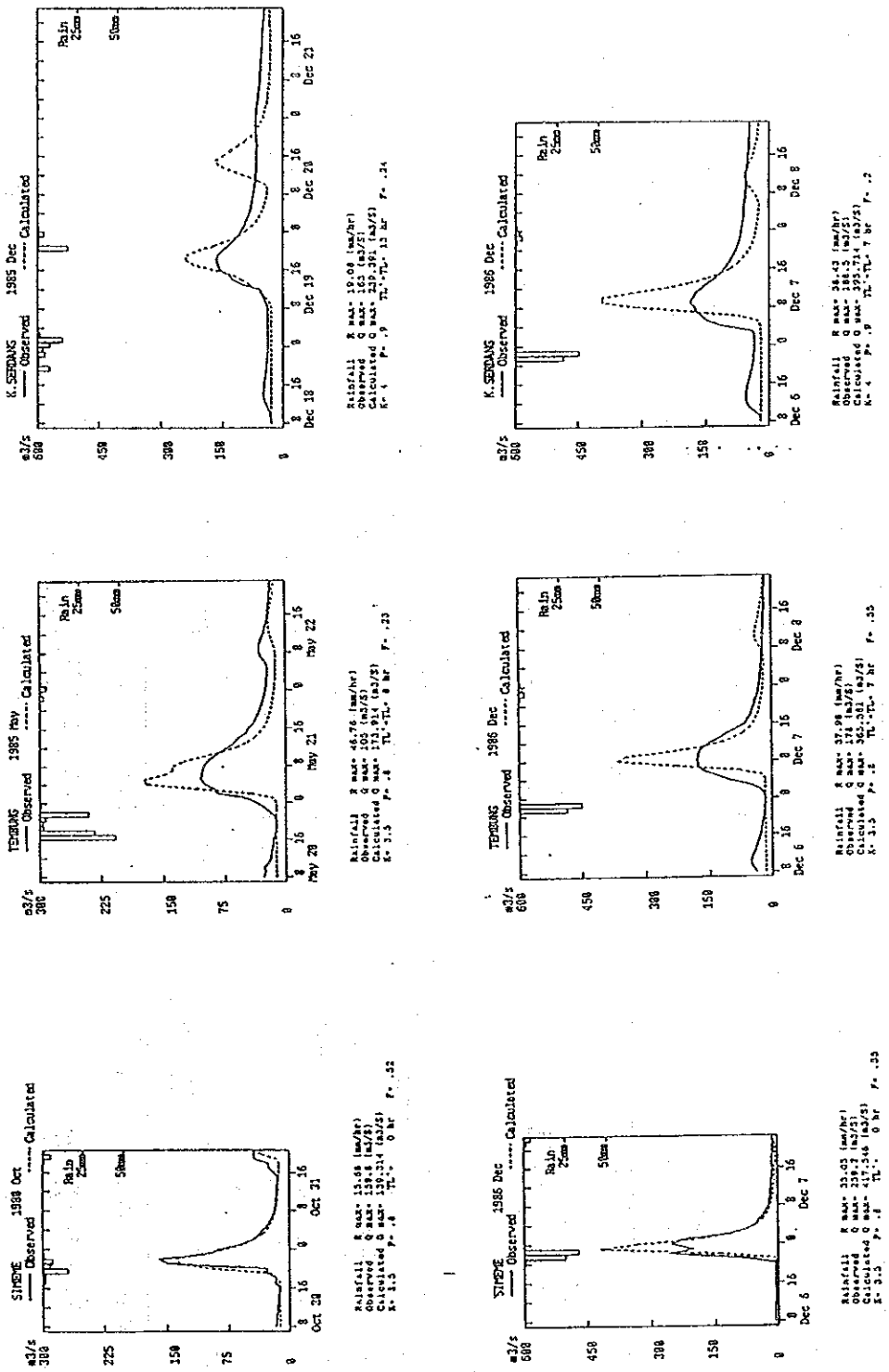
BELUTU R. MODEL



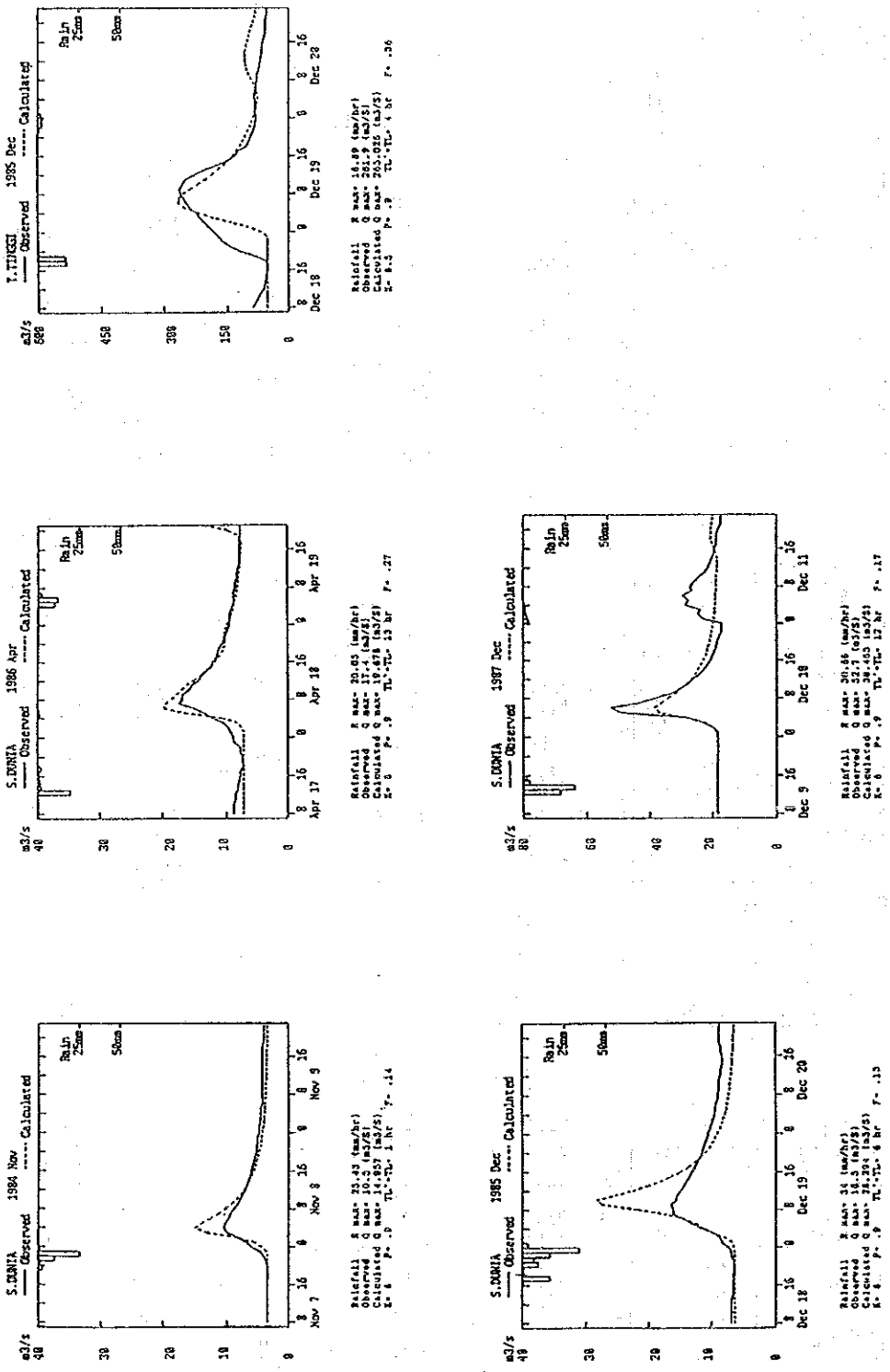
PADANG R. MODEL



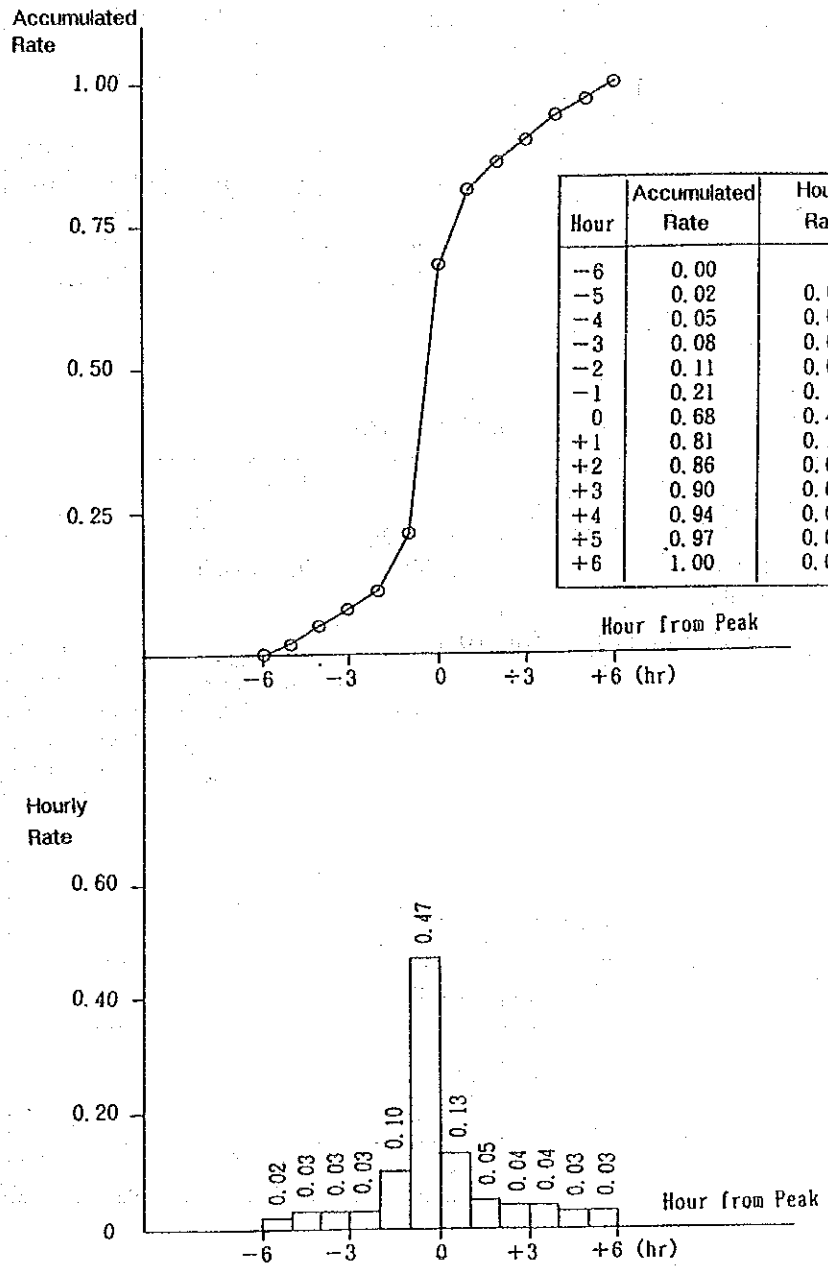
THE STUDY ON BELAWAN-PADANG INTEGRATED RIVER BASIN DEVELOPMENT IN THE REPUBLIC OF INDONESIA	BASIN RUNOFF MODEL
JAPAN INTERNATIONAL COOPERATION AGENCY	Fig.3-4(3/3)



THE STUDY ON BELAWAN-PADANG INTEGRATED RIVER BASIN DEVELOPMENT IN THE REPUBLIC OF INDONESIA	RESULTS OF MODEL CALIBRATION
JAPAN INTERNATIONAL COOPERATION AGENCY	Fig.3-5(1/2)

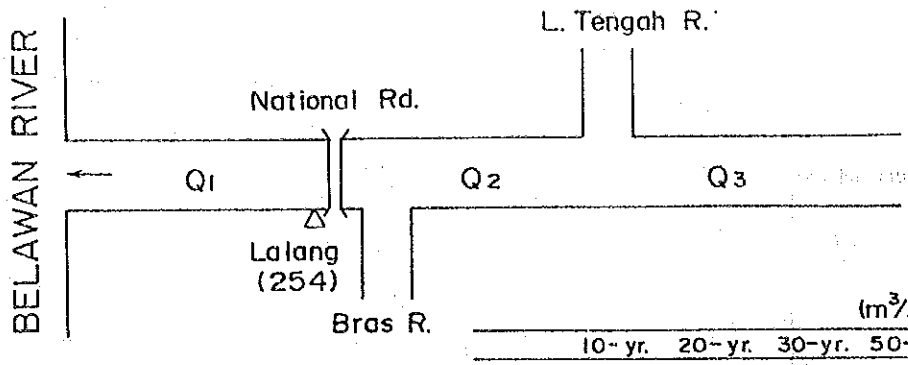


THE STUDY ON BELAWAN-PADANG INTEGRATED RIVER BASIN DEVELOPMENT IN THE REPUBLIC OF INDONESIA	RESULTS OF MODEL CALIBRATION
JAPAN INTERNATIONAL COOPERATION AGENCY	Fig.3-5(2/2)



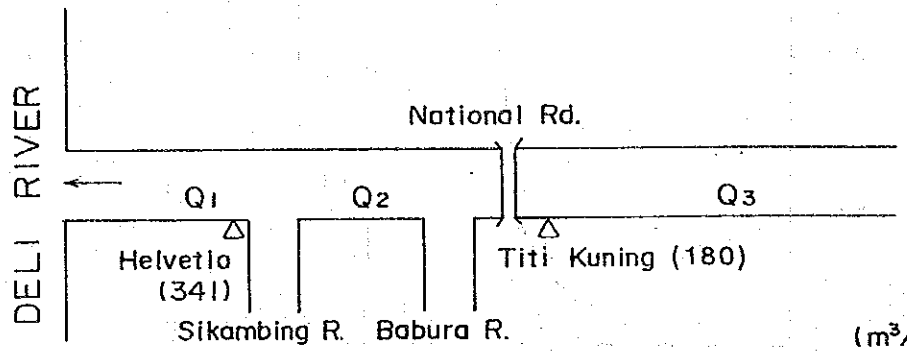
Hour	Accumulated Rate	Hourly Rate
−6	0.00	
−5	0.02	0.02
−4	0.05	0.03
−3	0.08	0.03
−2	0.11	0.03
−1	0.21	0.10
0	0.68	0.47
+1	0.81	0.13
+2	0.86	0.05
+3	0.90	0.04
+4	0.94	0.04
+5	0.97	0.03
+6	1.00	0.03

THE STUDY ON BELAWAN-PADANG INTEGRATED RIVER BASIN DEVELOPMENT IN THE REPUBLIC OF INDONESIA	DESIGN STORM PATTERN
JAPAN INTERNATIONAL COOPERATION AGENCY	Fig.3-6



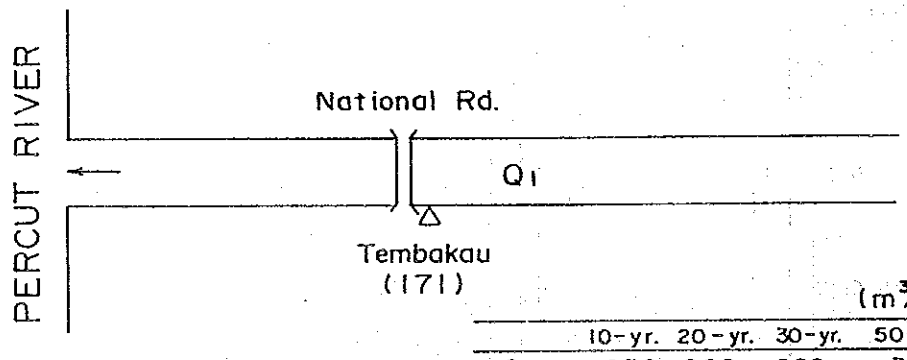
(m³/s)

	10-yr.	20-yr.	30-yr.	50-yr.
Q1	410	470	510	550
Q2	390	440	480	510
Q3	250	290	310	340



(m³/s)

	10-yr.	20-yr.	30-yr.	50-yr.	100-yr.
Q1	460	530	570	620	690
Q2	420	490	520	570	640
Q3	260	300	320	340	380



(m³/s)

	10-yr.	20-yr.	30-yr.	50-yr.	100-yr.
Q1	230	260	280	300	340

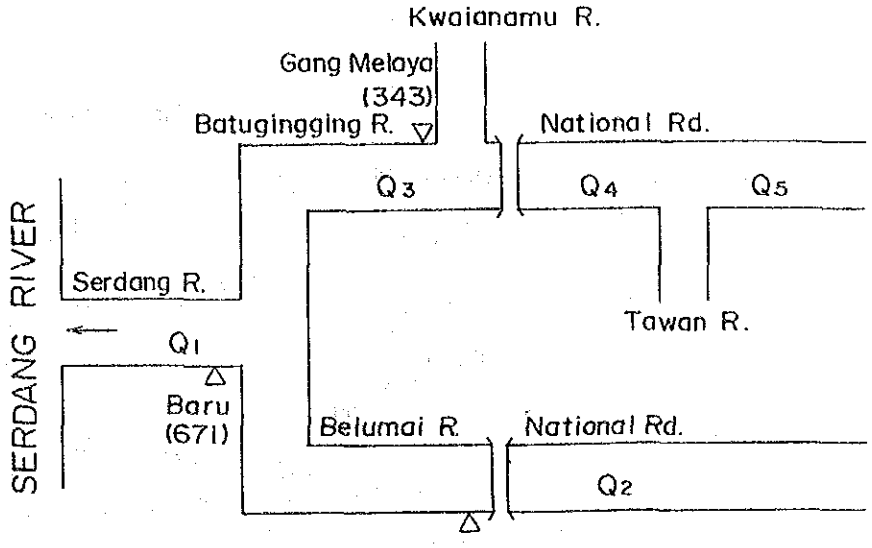
LEGEND

River Course

△ Reference Point

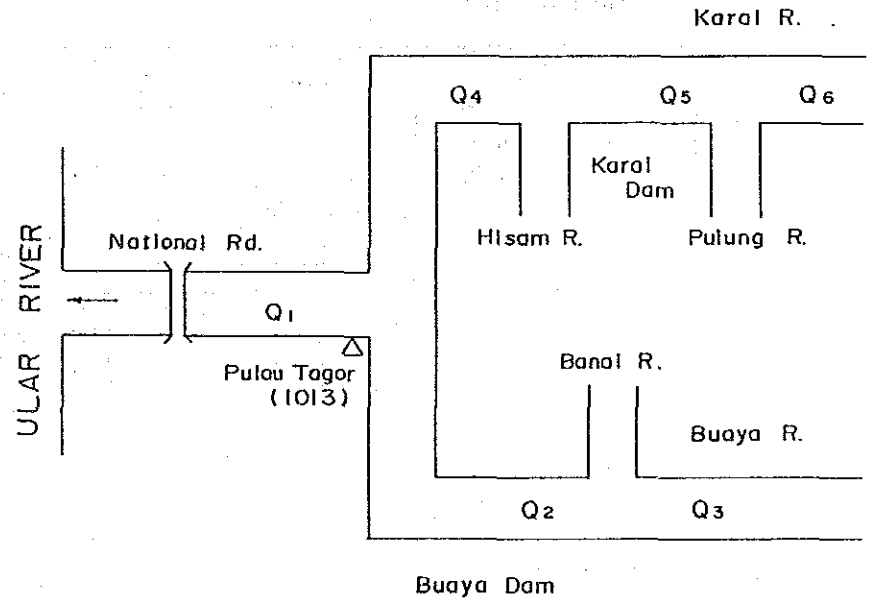
(000) Catchment Area (km²)

THE STUDY ON BELAWAN-PADANG INTEGRATED RIVER BASIN DEVELOPMENT IN THE REPUBLIC OF INDONESIA	PROBABLE FLOOD DISCHARGE DISTRIBUTION
JAPAN INTERNATIONAL COOPERATION AGENCY	Fig.3-7(1/3)



(m³/s)

	10-yr.	20-yr.	30-yr.	50-yr.
Q1	680	750	800	850
Q2	270	290	310	330
Q3	390	420	450	480
Q4	310	340	360	380
Q5	100	110	120	130



(m³/s)

	10-yr.	20-yr.	30-yr.	50-yr.
Q1	710	820	890	970
Q2	310	360	390	420
Q3	210	240	260	290
Q4	410	470	510	550
Q5	370	420	450	500
Q6	230	260	280	310

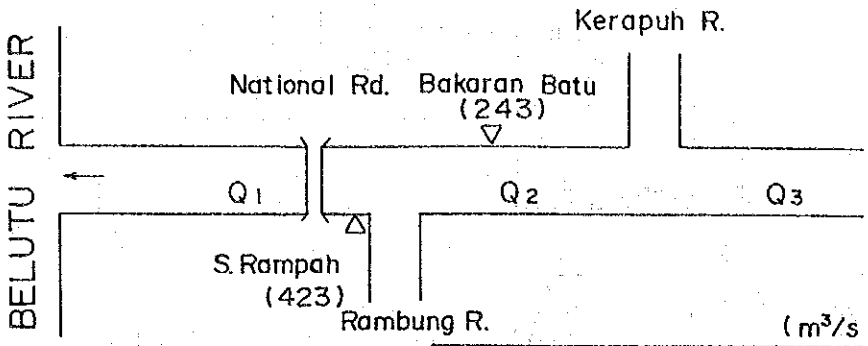
LEGEND
- River Course
- △ Reference Point
- (000) Catchment Area (km²)

THE STUDY ON BELAWAN-PADANG INTEGRATED RIVER BASIN DEVELOPMENT IN THE REPUBLIC OF INDONESIA

JAPAN INTERNATIONAL COOPERATION AGENCY

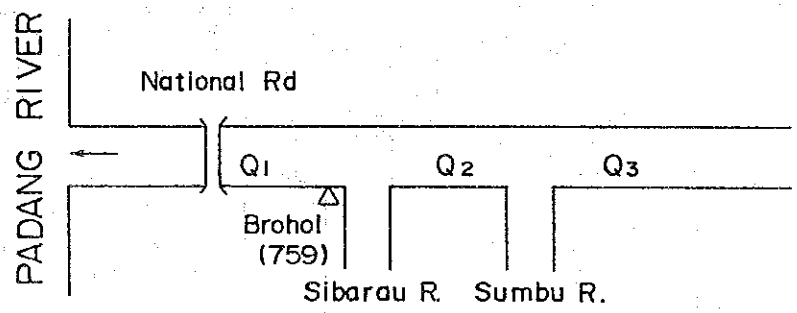
PROBABLE FLOOD DISCHARGE DISTRIBUTION

Fig.3-7(2/3)



(m³/s)

	10-yr.	20-yr.	30-yr.	50-yr
Q1	260	290	310	340
Q2	160	180	190	210
Q3	80	90	95	100



(m³/s)

	10-yr.	20-yr.	30-yr.	50-yr.
Q1	620	720	770	840
Q2	480	550	580	630
Q3	380	440	470	510

LEGEND

River Course

Reference Point

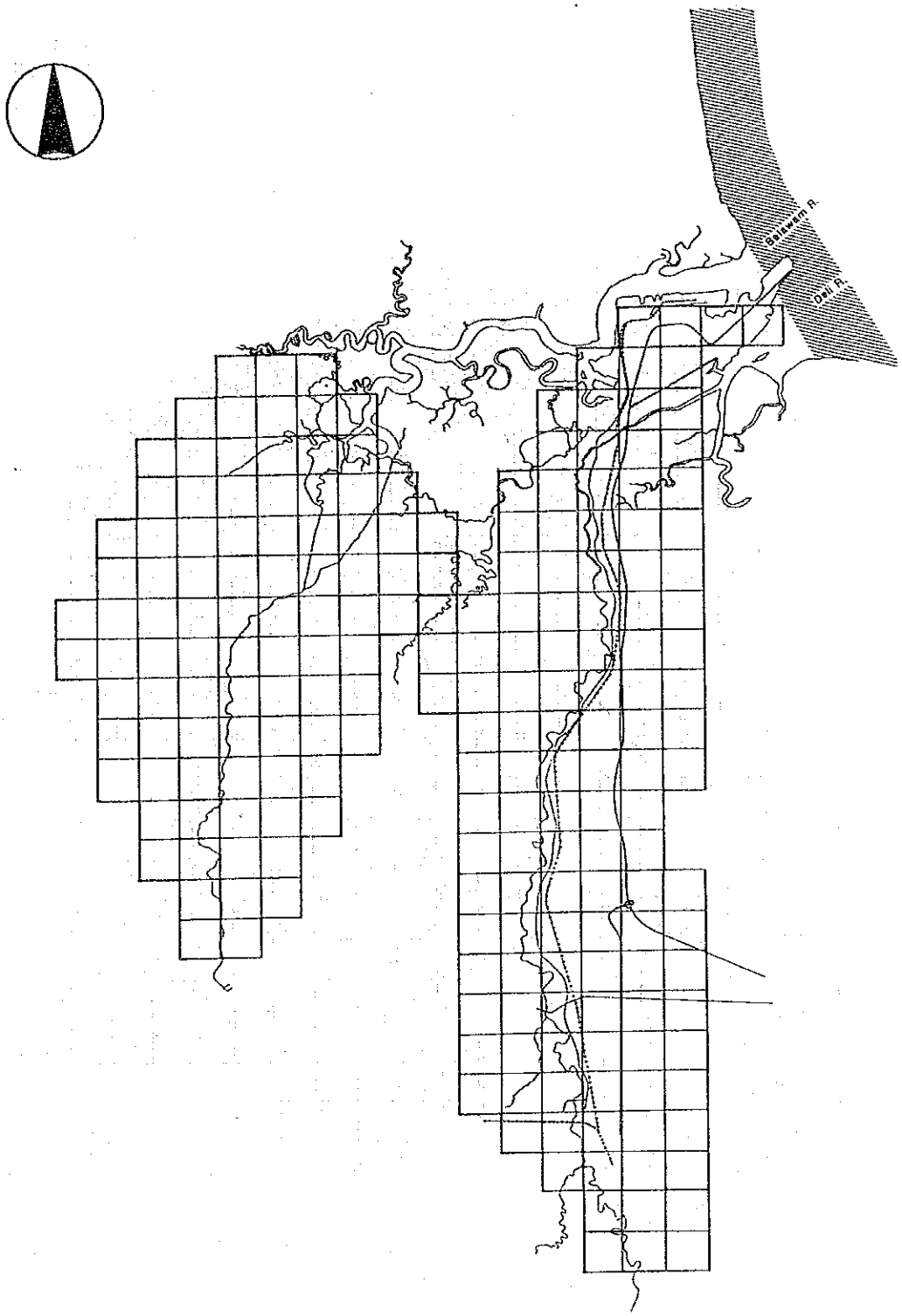
(000) Catchment Area (km²)

THE STUDY ON BELAWAN-PADANG INTEGRATED RIVER BASIN DEVELOPMENT IN THE REPUBLIC OF INDONESIA

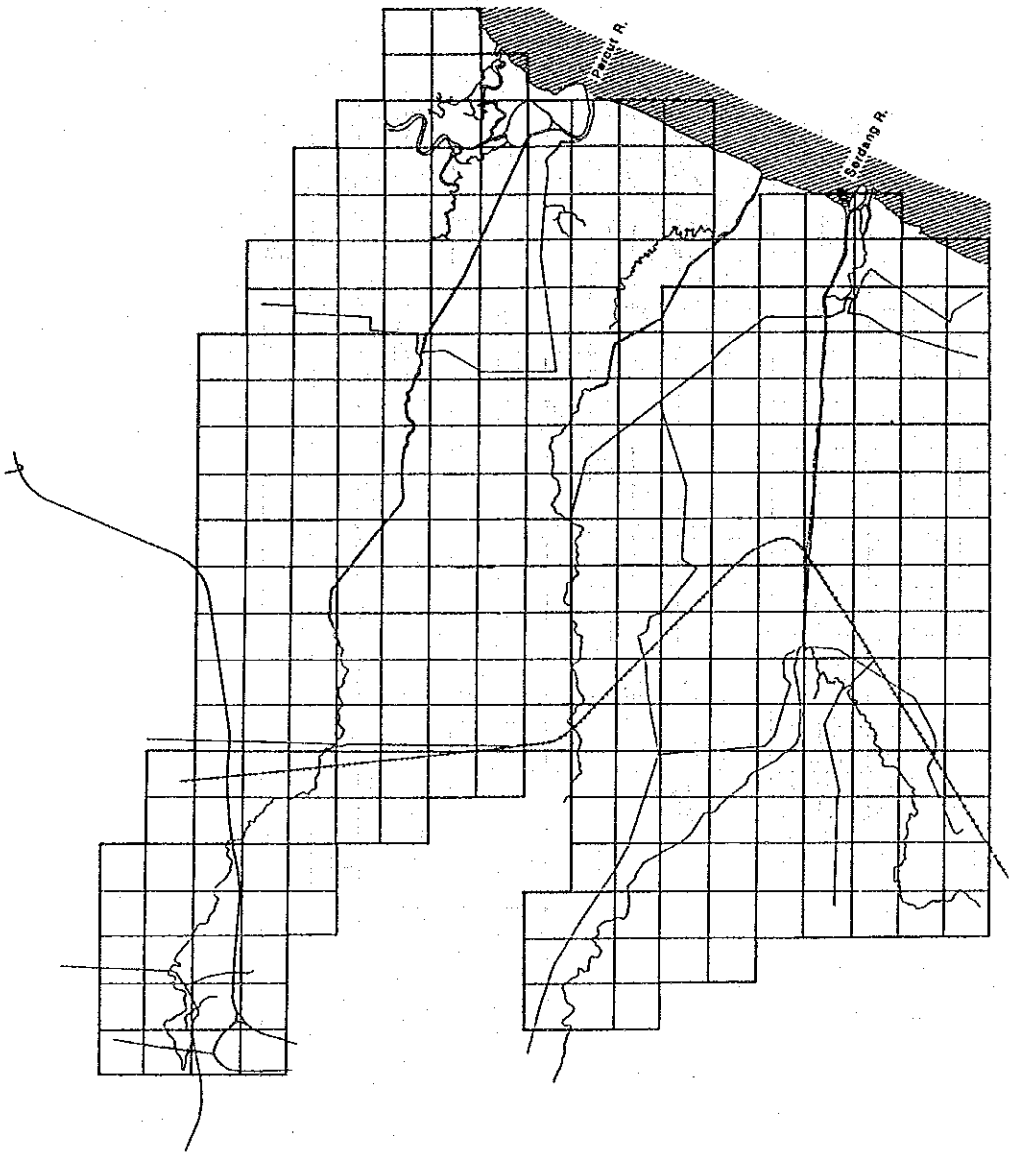
JAPAN INTERNATIONAL COOPERATION AGENCY

PROBABLE FLOOD DISCHARGE DISTRIBUTION

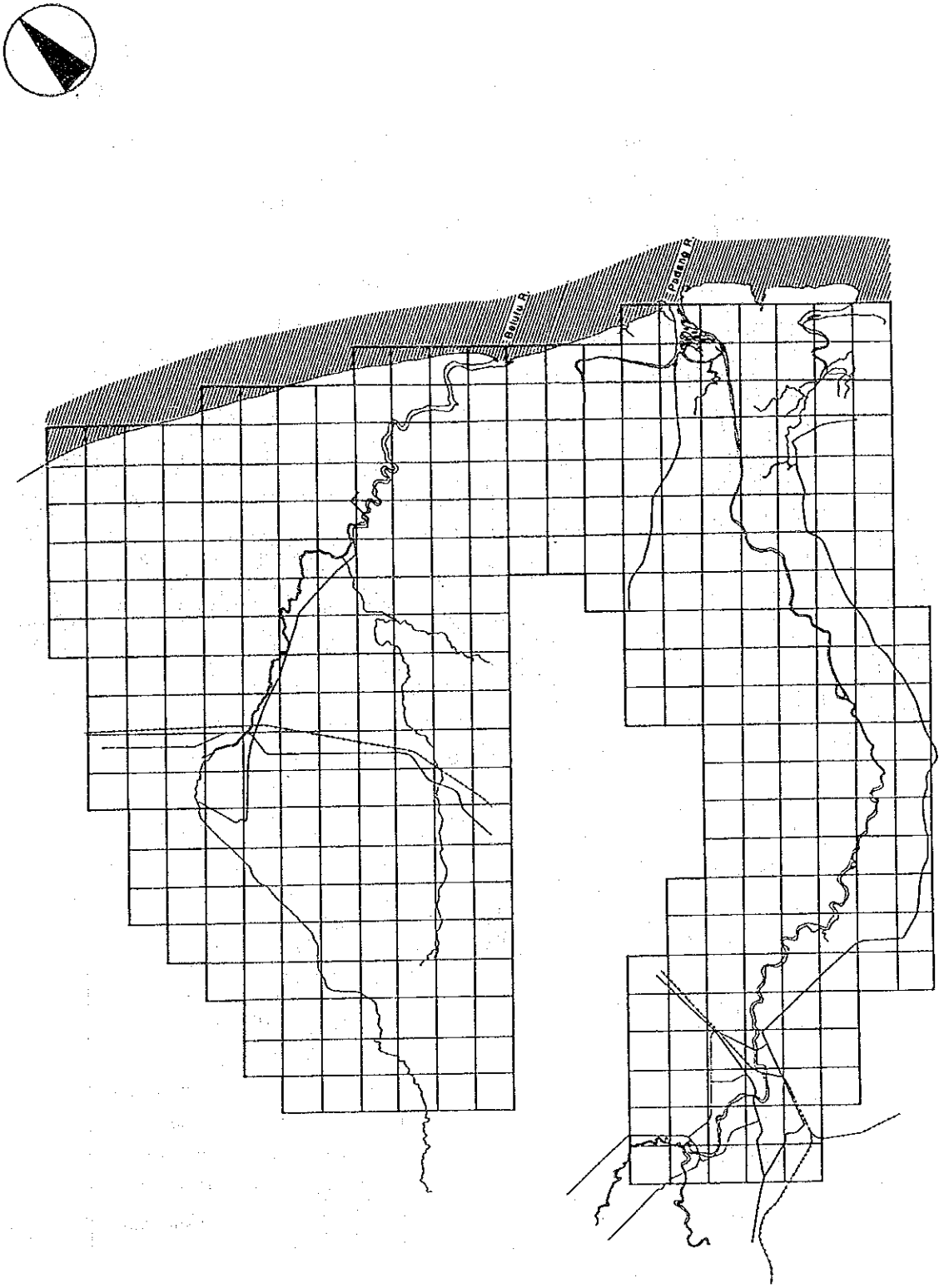
Fig.3-7(3/3)



THE STUDY ON BELAWAN-PADANG INTEGRATED RIVER BASIN DEVELOPMENT IN THE REPUBLIC OF INDONESIA JAPAN INTERNATIONAL COOPERATION AGENCY	MESH MAP OF INUNDATION AREA Fig.3-8(1/3)



THE STUDY ON BELAWAN-PADANG INTEGRATED RIVER BASIN DEVELOPMENT IN THE REPUBLIC OF INDONESIA	MESH MAP OF INUNDATION AREA
JAPAN INTERNATIONAL COOPERATION AGENCY	Fig.3-8(2/3)

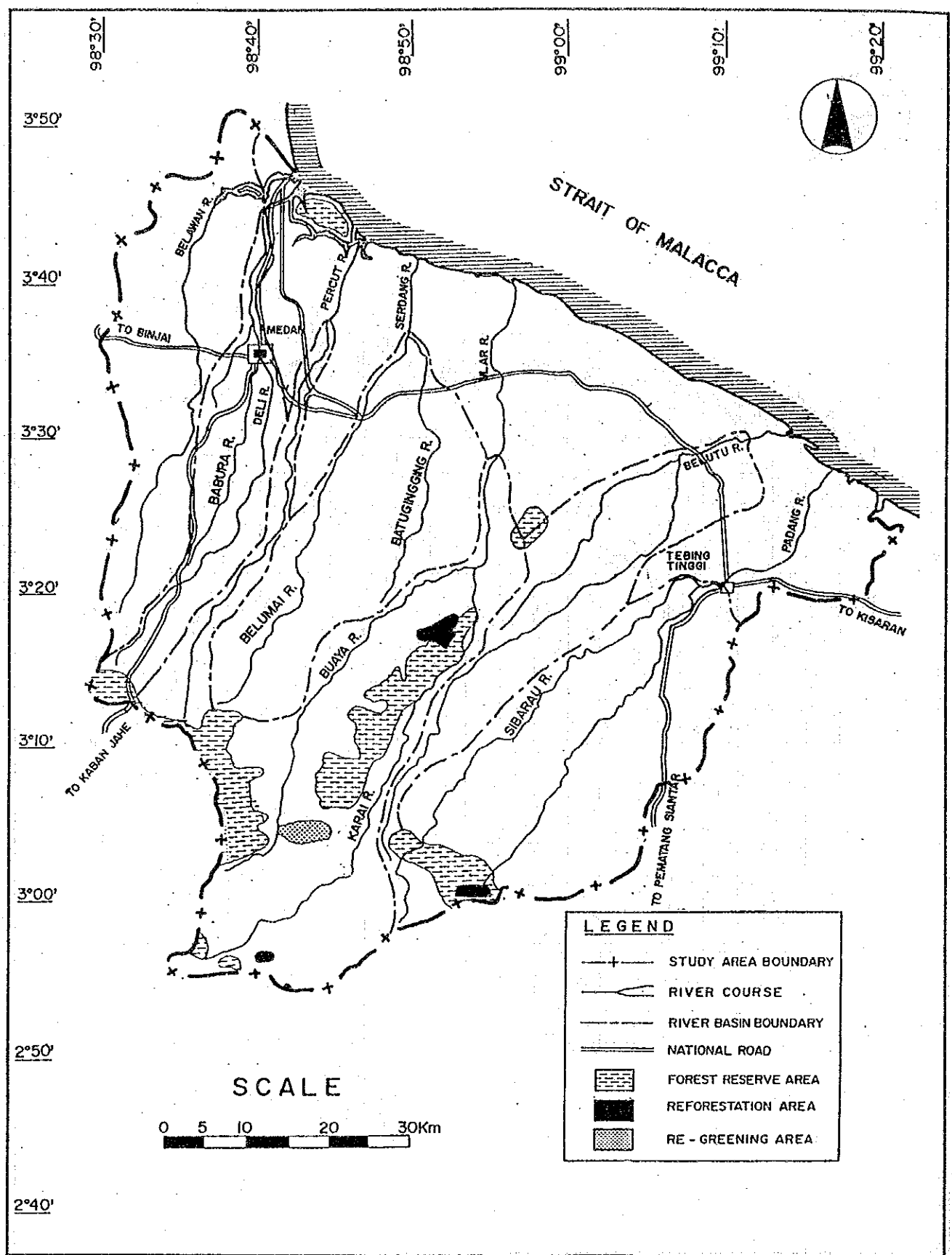


THE STUDY ON BELAWAN-PADANG INTEGRATED RIVER BASIN DEVELOPMENT IN THE REPUBLIC OF INDONESIA

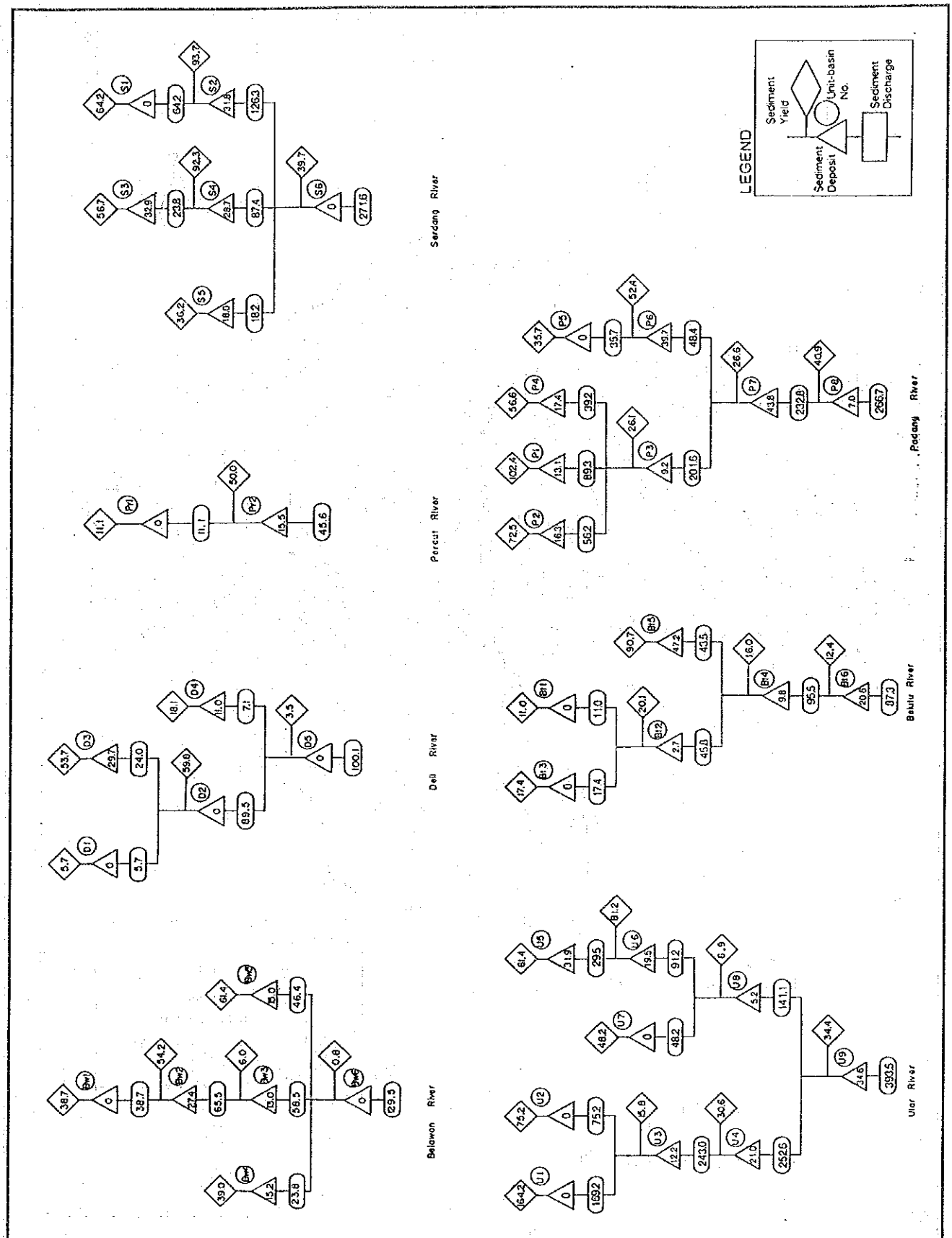
JAPAN INTERNATIONAL COOPERATION AGENCY

MESH MAP OF INUNDATION AREA

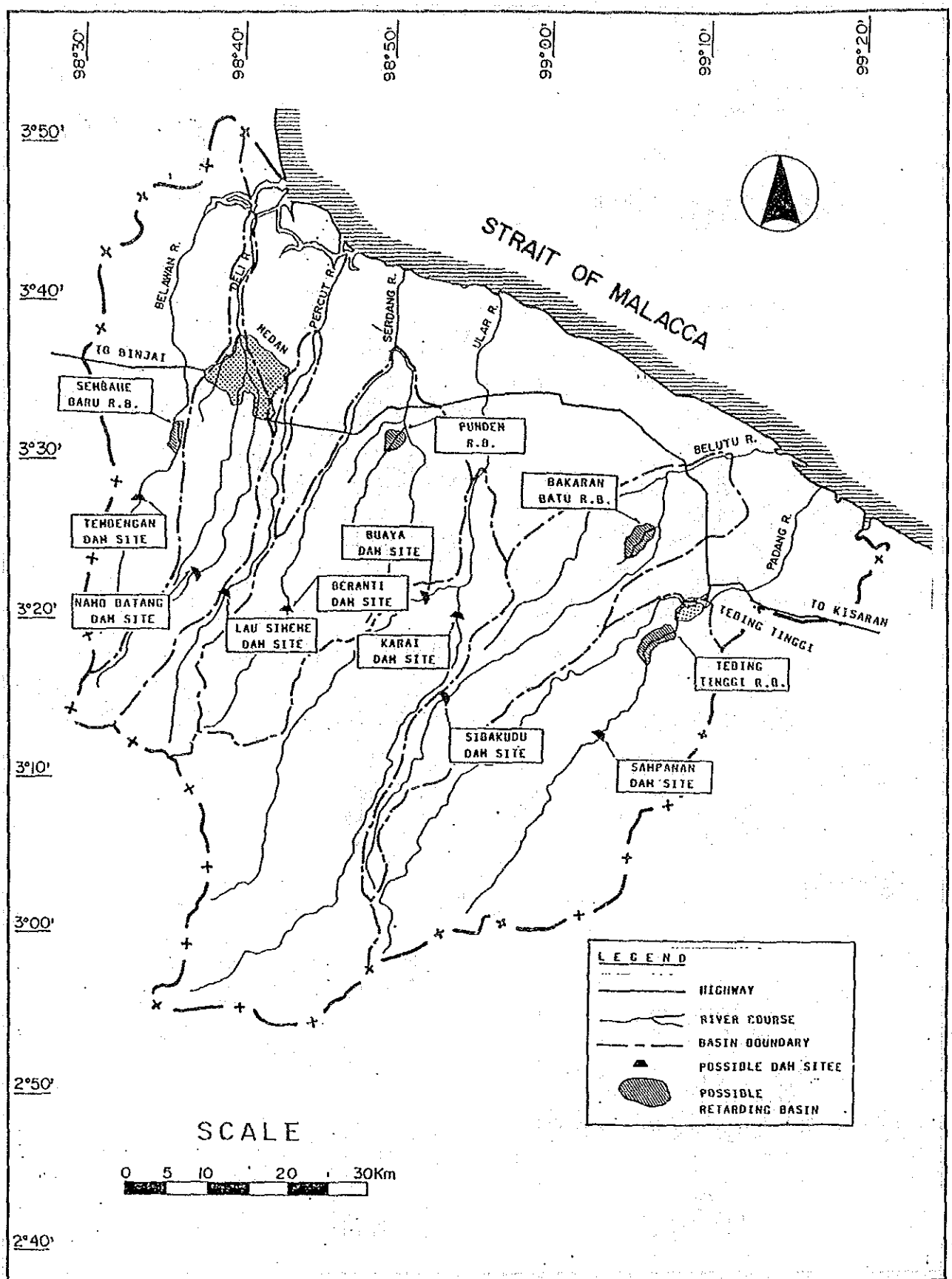
Fig.3-8(3/3)



THE STUDY ON BELAWAN-PADANG INTEGRATED RIVER BASIN DEVELOPMENT IN THE REPUBLIC OF INDONESIA	FOREST CONSERVATION AREA
JAPAN INTERNATIONAL COOPERATION AGENCY	Fig.3-9



THE STUDY ON BELAWAN-PADANG INTEGRATED RIVER BASIN DEVELOPMENT IN THE REPUBLIC OF INDONESIA	FLOW DIAGRAM OF SEDIMENT BALANCE CALCULATION
JAPAN INTERNATIONAL COOPERATION AGENCY	Fig.3-10



THE STUDY ON BELAWAN-PADANG INTEGRATED RIVER BASIN DEVELOPMENT IN THE REPUBLIC OF INDONESIA JAPAN INTERNATIONAL COOPERATION AGENCY	LOCATION OF POSSIBLE DAM SITES Fig.3-11