Table 57 JOINT COST ALLOCATION OF BERIS DAM, ALTERNATIVE 3, CASE B (6/6)

JOINT COST ALLOCATION

ITEM	KEDAH RIVER SYSTEM					MUDA-PERAI SYSTEM					TOTAL
	MADA MAIN	MAIN MINOR	TRIBUTARY MINOR	D & I	RIVER MAINTE-NANCE FLOW	MAIN MINOR KEDAH	MAIN MINOR P.PINANG	TRIBUTARY MINOR	D & I KEDAH	D & I P.PINANG	
1.1 PROJECT COST TO BE ALLOCATED											
CONSTRUCTION											67.76
O&M											1.22
TOTAL											68.98
1.2 BENEFIT	73.00	1.52	9.58	3.01	2.64	0.00	0.00	0.00	0.00	0.00	89.75
1.3 ALTERNATIVE COST											
CONSTRUCTION	57.66	28.41	31.64	29.18	28.97	0.00	0.00	0.00	0.00	0.00	175.86
ANNUAL O&M	.1536	.138	.1395	.1384	.1383	0	0	0	0	0	.7078
O&M	1.17	1.05	1.06	1.06	1.05	0.00	0.00	0.00	0.00	0.00	5.40
SUB TOTAL	58.83	29.46	32.70	30.24	30.02	0.00	0.00	0.00	0.00	0.00	181.26
1.4 JUSTIFIABLE EXPENDITURE	58.83	1.52	9.58	3.01	2.64	0.00	0.00	0.00	0.00	0.00	89.75
1.5 SEPARABLE COST											
CONSTRUCTION	32.97	1.12	6.17	2.45	2.17	0.00	0.00	0.00	0.00	0.00	44.88
ANNUAL O&M	.019	.0007	.004	.0015	.0014	0	0	0	0	0	.0266
O&M	0.14	0.01	0.03	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.20
SUB TOTAL	33.11	1.13	6.20	2.46	2.18	0.00	0.00	0.00	0.00	0.00	45.08
1.6 REMAINING JUSTI-FIABLE EXPENDITURE	25.72	0.39	3.38	0.55	0.46	0.00	0.00	0.00	0.00	0.00	30.50
1.7 PERCENTAGE DIS-TRIBUTION OF 1.6	84.32	1.29	11.08	1.80	1.51	0.00	0.00	0.00	0.00	0.00	100.00
*** TOTAL REMAINING JOINT COST (CON)											22.88
TOTAL REMAINING JOINT COST (O&M)											1.02
1.8 REMAINING JOINT COST											
CONSTRUCTION	19.29	0.30	2.54	0.41	0.34	0.00	0.00	0.00	0.00	0.00	22.88
O&M	0.86	0.01	0.11	0.02	0.02	0.00	0.00	0.00	0.00	0.00	1.02
SUB TOTAL	20.15	0.31	2.65	0.43	0.36	0.00	0.00	0.00	0.00	0.00	23.90
1.9 TOTAL ALLOCATED COST											
CONSTRUCTION	52.26	1.42	8.71	2.86	2.51	0.00	0.00	0.00	0.00	0.00	67.76
O&M	1.00	0.02	0.14	0.03	0.03	0.00	0.00	0.00	0.00	0.00	1.22
TOTAL	53.27	1.43	8.85	2.89	2.54	0.00	0.00	0.00	0.00	0.00	68.98
PERCENTAGE OF DIS-TRIBUTION	77.22	2.08	12.83	4.19	3.68	0.00	0.00	0.00	0.00	0.00	100.00
2.1 ANNUAL COST											
CONSTRUCTION	6.85	0.19	1.14	0.38	0.33	0.00	0.00	0.00	0.00	0.00	8.88
O&M	.131	.002	.019	.004	.003	0	0	0	0	0	.159

REMARKS; AT 1983 CONSTANT PRICE

Table 58 CONSTRUCTION COST ALLOCATION TO AGENCIES CONCERNED

	MADA	Kedah		P. Pinang	
		DID	PWD	DID	PWA
Case A:					
Alternative 1	33.14	47.65	4.70	4.60	6.50
Alternative 2	36.70	45.95	4.86	2.58	6.50
Alternative 3	60.07	33.61	2.91	0	0
Case B:					
Alternative 1	58.72	19.26	6.64	5.12	6.85
Alternative 2	62.44	18.46	6.86	1.95	6.88
Alternative 3	74.58	17.96	4.05	0	0

Table 59 TYPICAL FARM BUDGET OF AVERAGE FARM HOUSEHOLD FOR ONE CROP SEASON

Unit: M$/ha

	Without-project		With-project	
	MADA	Rainfed	MADA	Minor
(1) Paddy Expenditure				
Material inputs	46.77	36.55	50.17	46.77
Hired machinery	407.53	318.55	437.18	407.53
Hired labour	423.57	331.09	454.38	423.57
Transportation	56.88	42.55	61.02	54.44
Taxes and others*	96.14	96.14	96.14	96.14
(Cost for land owner)	(1,030.89)	(824.88)	(1,098.89)	(1,028.45)
Land rent	285.00	285.00	285.00	285.00
Total	1,315.89	1,109.88	1,383.89	1,313.45
(2) Paddy Income				
Paddy sales	1,576.80	604.80	1,971.00	1,773.90
Labour income	19.13	170.70	19.13	19.13
Other income	19.76	49.38	19.76	19.76
Gross cash income	(1,615.69)	(824.88)	(2,009.89)	(1,812.79)
Value of unsold paddy	583.20	583.20	729.00	656.10
Total	2,198.89	1,408.08	2,738.89	2,468.89
(3) Net Income				
Net cash income from paddy	584.80	0	911.00	784.34
Net income from paddy	883.00	298.20	1,355.00	1,155.44
Cash subsidy	457.88	457.88	457.88	457.88
Total net income	1,340.88	756.08	1,812.88	1,613.32
(4) Increase in cash income from paddy cultivation	-	-	326.20	784.34

Table 60 CASH FLOW TABLE FOR FEDERAL GOVERNMENT

Unit: M$10^6

Year	Outflow: Beris Dam Cost Foreign	Local	Total	Repayment for Foreign Loan	Inflow: Foreign Loan	Repayment from PWA	Repayment from PWD	Surplus Balance
1985	0.84	0.36	1.20	0.04	0.88	0.01	0	-0.35
1986	1.44	0.60	2.04	0.10	1.54	0.02	0	-0.58
1987	7.32	34.76	42.08	0.40	7.72	0.25	0.06	-34.45
1988	3.53	10.91	14.44	0.55	4.08	0.30	0.08	-10.53
1989	2.95	14.09	17.04	0.67	3.62	0.42	0.11	-13.56
1990				0.67		0.42	0.11	-0.14
1991				0.67		0.42	0.11	-0.14
1992				1.27		0.42	0.11	-0.74
.				.		.	.	.
.				.		.	.	.
.				.		.	.	.
2009				1.27		0.42	0.11	-0.74
2010						0.42	0.11	+0.53
2011						0.41	0.10	+0.51
2012						0.17	0.04	+0.21
2013						0.09	0.02	+0.11

Table 61 CASH FLOW TABLE FOR MADA

Unit: M$10^6

Year	Outflow: Beris Dam Cost Const.	O & M	Inflow: Federal Fund	Surplus Balance
1985	0.45		0.45	0
1986	0.78		0.78	0
1987	15.99		15.99	0
1988	5.48		5.48	0
1989	6.48		6.48	0
1990		0.06		-0.06
.		.		.
.		.		.
.		.		.
2015		0.06		-0.06

Table 62 CASH FLOW TABLE FOR KEDAH DID

Unit: M$10^6

Year	Outflow: Beris Dam Cost Const.	Outflow: Beris Dam Cost O & M	Inflow: Reimbursement from Federal	Surplus Balance
1985	0.57		0	-0.57
1986	0.97		0.57	-0.40
1987	20.02		0.97	-19.05
1988	6.87		20.02	+13.15
1989	8.11		6.87	-1.24
1990		0.08	8.11	+8.03
1991		0.08		-0.08
.		.		.
.		.		.
.		.		.
2015		0.08		-0.08

Table 63 CASH FLOW TABLE FOR PULAU PINANG DID

Unit: M$10^6

Year	Outflow: Beris Dam Cost Const.	Outflow: Beris Dam Cost O & M	Inflow: Reimbursement from Federal	Surplus Balance
1985	0.03		0	-0.03
1986	0.06		0.03	-0.03
1987	1.12		0.06	-1.06
1988	0.39		1.12	+0.73
1989	0.45		0.39	-0.06
1990		0	0.45	+0.45
1991		0		0
.		.		.
.		.		.
.		.		.
2015		0		0

Table 64 CASH FLOW TABLE FOR PWA

Unit: M$10^6

Year	Outlfow: Beris Dam Cost Const.	Outlfow: Beris Dam Cost O & M	Outlfow: Repayment to Federal	Inflow: Loan from Federal	Surplus Balance
1985	0.08		0.01	0.08	-0.01
1986	0.14		0.02	0.14	-0.02
1987	2.83		0.25	2.83	-0.24
1988	0.97		0.30	0.97	-0.32
1989	1.15		0.42	1.15	-0.41
1990		0	0.42		-0.42
.		.	.		.
.		.	.		.
.		.	.		.
2009		0	0.42		-0.42
2010		0	0.42		-0.42
2011		0	0.41		-0.41
2012		0	0.17		-0.17
2013		0	0.09		-0.09

Table 65 CASH FLOW TABLE FOR PWD, KEDAH

Unit: M$10^6

Year	Outflow: Beris Dam Cost Const.	Outflow: Beris Dam Cost O & M	Outflow: Repayment to Federal	Inflow: Loan from Federal	Inflow: Grant from Federal	Surplus Balance
1985	0.06		0	0.02	0.04	0
1986	0.10		0	0.03	0.07	0
1987	2.11		0.06	0.74	1.37	-0.06
1988	0.72		0.08	0.25	0.47	-0.08
1989	0.86		0.11	0.30	0.56	-0.11
1990		0.01	0.11			-0.12
.		.	.			.
.		.	.			.
.		.	.			.
2010		0.01	0.11			-0.12
2011		0.01	0.10			-0.11
2012		0.01	0.04			-0.05
2013		0.01	0.02			-0.03

ANNEX K

LAND ACQUISITION COST AND ENVIRONMENTAL SUDIES

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1. INTRODUCTION

Field investigations for the study on present land use, land acquisition cost and environmental aspects were carried out from June to July, 1984, in and around the proposed Beris reservoir area.

Based on the results of the field investigation, this Annex presents the present land use in the proposed Beris reservoir area in Chapter 2, land acquisition cost in Chapter 3 and resettlement plan in Chapter 4 to prepare a compensation program. For economic evaluation purpose, the production forgone is estimated and presented in Chapter 5. The environmental impacts caused by creation of the Beris reservoir are discussed in 2 aspects, i.e. short-term effects and long-term effects in Chapter 6.

2. PRESENT LAND USE IN THE PROPOSED BERIS RESERVOIR AREA

The proposed Beris dam is located at about 1.6 km upstream of the confluence of the Beris river and the Muda river. The Beris reservoir area to be created by the proposed dam covers about 1,600 ha extending to about 20 km southeastward of the proposed dam site along the upper course of the Beris river and its tributaries as shown in Plate 1. Northwestern part of the reservoir area including the dam site is located in Terenas forest reserve area. The remaining part of the reservoir area is extended to the low-lying agricultural area between Terenas forest reserve area and Rimba Telui forest reserve area.

By the construction of the Beris dam, 3 villages located along the existing Nami-Sik road are mostly submerged under the reservoir. The population and number of household of these 3 villages are estimated as shown below based on the results of interviews with village headmen.

Name of Village	Population	Household
Kg. Batu Seketul	500	100
Kg. Sg. Batang	1,600	280
Kg. Terenas	500	130
Total	2,600	510

Present land use in the proposed Beris reservoir area is mapped on the 1/10,000 scale topographic map based on the field investigation executed from June to July, 1984. Then, it is quantified for 4 alternative reservoir water levels. The reservoir area is measured at the maximum water level, or the normal high water level plus flood storage depth of 2.7 m. The estimated area of present land use by land use category is as shown in Table 1. For the proposed maximum water level of El. 87.7 m, the reservoir area is measured to be 1,597 ha in total comprizing 492 ha (31%) of rubber field, 143 ha (9%) of paddy field, 261 ha (16%) of residential and mixed cultivation land and 701 ha (44%) of forest area. The reservoir area for the alternative reservoir water levels varies widely from 761 ha (El. 79.7 m) to 1,912 ha (El. 90.7 m) as shown in Table 1. However the proportion of present land use in the reservoir area is almost the same as that for the proposed maximum water level of El. 87.7 m.

The number of houses and public facilities which will be submerged under the reservoir is estimated as shown in Table 1. For the proposed maximum water level of El. 87.7 m, 336 houses and 10 public facilities distributed in 3 villages are estimated to be submerged.

3. LAND ACQUISITION COST

The land acquisiton cost in this Annex consists of compensation costs for lands and houses and relocation cost of public facilities. However, the relocation cost for Nami-Sik road and low voltage power line are estimated as a part of construction cost of the project facilities as described in Annex I "Design and Cost Estimate", and are not included in this Annex.

To estimate the compensation cost of houses, the classification standard of houses is first established as typically illustrated in Fig. 1. Class A house is made of wood and concrete, Class B house is made of wood and Class C house is bamboo houses. During the field investigation in June/July 1984, all houses in 3 villages in the proposed Beris reservoir area were investigated and classified into the 3 classes. Based on these data,number of houses submerged under the proposed Beris reservoir is calculated at different reservoir water level by class as shown in Table 2. For the proposed maximum water level of El. 87.7 m, 336 houses will be submerged comprizing 18 Class A houses, 245 Class B houses and 73 Class C houses.

The unit price of agricultural and residential area, alienated forest, houses and public facilities is assumed as shown in Table 3 based on information from KEDA and interview on the current market price.

The land acquisition cost for the proposed Beris reservoir area is estimated by multiplying the quantity (Tables 1 and 2) by the unit price (Table 3) as shown in Table 4. In case of the proposed maximum water level of El. 87.7 m, total land acquisition cost of M$25.7 x 10^6 will be required comprizing M$25.01 x 10^6 for compensation of lands and houses and M$0.69 x 10^6 for relocation of public facilities.

To use in the least-cost alternative study in Annex I, the land acquisition cost for the proposed Tawar-Muda reservoir area is estimated as shown in Table 5 by using the submerged area and number of houses which were estimated in Part 1 Study (Ref. K 1) and the same unit price (Table 4) as adopted to the Beris reservoir area.

4. RESETTLEMENT PLAN

A resettlement plan is worked out for reference. Under the condition that a detailed socio-economic survey is still to be conducted, it is assumed that a new land should be developed allowing the same land uses as those in the proposed flooded area.

The location of proposed resettlement area for residential/mixed cultivation area and paddy field is selected on the east of the Nami-Sik road about 3 km to the northeast of Batu Seketul village as shown in Fig. 2 because of the following reasons.

(1) Topographic condition in the proposed area is gentle and suitable for development;

(2) The proposed area is close to Gulau village, which is an existing community center near the proposed Beris reservoir area.

Paying attention to the importance to keep village community, the resettlement plan is made as follows:

(1) The whole of Sg. Batang village (280 households) is resettled in the new area though some houses in this village will not be affected.

(2) All of the submerged houses (54 households) in Batu Seketul village is resettled in the new area. Other houses not affected is assumed to remain because they can keep village community with relocated houses owing to close location.

(3) Submerged houses in Terenas village (51 households) is assumed to be absorbed into community center zone of Terenas village where is not affected by the Beris reservoir. And no resettlement plan is made for submerged houses in this village.

Assuming that the present size of land use for residential/mixed cultivation area and paddy field in the submerged area (1.2 ha per household on an average) should be assured, the required size of the resettlement area for residential/mixed cultivation area and paddy field is estimated to be 400 ha (334 household x 1.2 ha/household = 400 ha).

The present land use in the proposed resettlement area of 400 ha comprizes 100 ha of forest reserve and 300 ha of rubber farms. All of the public facilities in the reservoir area are proposed to be relocated in this area. Illustration of proposed resettlement area is as shown in Fig. 2.

There are rubber farms along the proposed relocation road of the Nami-Sik road. It seems that there are 1,000 ha of potential area for rubber farms in the forest reserve adjacent to the above-mentioned rubber farms and on the western side of the existing Nami-Sik road near the

proposed resettlement area. It is proposed to develop 500 ha of rubber farms in the potential area in order to compensate the submerged rubber farms in the Beris reservoir area. To assure the rubber production by resettled farmers, rubber farms in the potential area are desirable to be developed before the commencement of the construction of the Beris dam.

The resettlement cost consists of the land acquisition cost, development cost for resettlement area and rubber farms, and construction costs of houses and public facilities. The resettlement cost is estimated as shown in Table 6 for reference. This cost is not included in the project costs for implementation of the Beris dam. However, if the proposed resettlement plan is implemented, total costs for resettlement and land acquisition for Terenas village will be M$25.4 x 10^6, i.e. M$18.5 x 10^6 of resettlement cost plus M$6.9 x 10^6 of land acquisition cost for Terenas village, which is M$0.3 x 10^6 lower than the total land acquisition cost of M$25.7 x 10^6.

5. PRODUCTION FORGONE AND ECONOMIC INVESTMENT COST

After a land is submerged under a reservoir, previous production on the land can no longer be continued. This production forgone is a negative economic benefit attributable to the reservoir project. The production forgone is estimated to be the net production value which would be obtained if the project is not implemented. For the purpose to evaluate the Beris dam project, the production forgone in the proposed Beris reservoir is estimated.

The production forgone is estimated by multiplying the net production value of agricultural products by area of agricultural use. The net production value for paddy, rubber, mixed horticulture and forests is estimated in Annex C, Agriculture. The results are shown in Table 7. Assuming that the present land use in the proposed Beris reservoir is not changed in future, the production forgone for proposed and alternative reservoir water levels is estimated as shown in Table 8. The estimated production forgone for proposed maximum water level of 87.7 m is M$0.8 x 10^6 per annum.

The economic investment cost incidental to the land acquisition is such cost that it will not accrue if the land is not acquired. It includes the construction cost of houses and public facilities for the removed people. Land acquisition costs for rubber, paddy, mixed cultivation land and alienated forest are not counted as economic investment costs, because investment on substitutional land will be made, irrespective of the acquisition of the previous land. The economic cost of houses and public facilities is estimated at M$3.88 x 10^6 by multiplying the financial cost of M$4.36 x 10^6 by the general conversion factor of 0.89.

6. ENVIRONMENTAL IMPACTS

6.1 Short-Term Effects

The short-term effects are the environmental impacts during the construction period of the proposed Beris dam. The adverse effects due to construction works are presumed as follows:

(1) Deterioration of water quality

During the construction works, deterioration of water quality of the Beris river water is presumed mainly due to increase of suspended solids produced by erosion caused by construction works such as diversion works, main dam and saddle dam works, quarry site and subsidiary works. To minimize such adverse effects, sedimentation ponds are desirable to be installed near the construciton site.

(2) Environmental impacts along the existing roads

During the construction period, the traffic volume may drastically be increased around the Beris dam site. Most of the traffic increased will be heavy-duty cars including 8-ton dump tracks. The increased traffic causes adverse effects on environment along the road due to exhaused gas, noise and vibration. The traffic control including restriction of speed in the village and other necessary area should be considered.

(3) Suspension of maintenance flow

According to the construction schedule, the diversion tunnel will be closed on 31st October, 1989. To assure the maintenance flow of 0.2 m^3/s to the downstream of the dam site, a temporary inlet valve is planned to be equipped at the river outlet works. After the closure of the diversion the river water level reachs to the inlet valve within 2 days. Therefore, the maintenance flow is substantially not suspended during the construction period.

6.2 Long-Term Effects

The long-term effects on environment are those caused by operation of the proposed Beris dam and reservoir. Two kinds of effects, i.e. beneficial effects and adverse effects, are presumed as described hereunder.

6.2.1 Beneficial effects

(1) Assurance of maintenance flow

The necessary maintenance flow in the Muda river will be assured through the year to keep the river water quality less than 5 mg/lit (BOD) at D&I water supply and irrigation intakes and less than 10 mg/lit (BOD) in all river stretches of the Muda river for the preservation of environmental quality.

(2) Reduciton of flood discharge

Owing to the flood control function of the proposed Beris dam, the peak flood discharge at the downstream of the Beris dam will drastically be reduced. After the completion of the Beris dam, the flood hazard caused by the ordinary flood will be negligible. Even the probable maximum flood of 900 m^3/s (without dam condition) can be reduced to 200 m^3/s at the downstream of the dam. This reduction of peak flood discharge causes beneficial effects on people and land use along the river course of the Beris river.

6.2.2 Adverse effects

(1) Loss of wildlife habitat

By the creation of the proposed Beris reservoir, 561 ha of unalienated forest, a best wildlife habitat, will be lost by flooding. Present inhabitant of wildlife in the proposed Beris reservoir area was surveyed by the Wildlife Department, Alor Setar, as a preliminary survey. According to the results of this survey, eleven species of wild animals were found in and around the proposed Beris reservoir area. These animals are Common Wild Pig, Leaf Monkey, White-handed Gibbon, Long-tailed Porcupine, Common Palm Civet, Malay Civet, Samber Deer, Barking Deer, Lesser Mouse Deer, Tiger and Leopard. Features of these wild animals are briefly explained in Table 10. Illustration of some typical animals in the Beris area is shown in Fig. 3. There is no information about the number of inhabitants.

According to the opinion of officials in the Wildlife Department, there may be no serious damage on wildlife in the proposed Beris reservoir area because this area has been developed for a long time and human activity in this area has already been affected wildlife habitat.

(2) Possibility of eutrophication in the Beris reservoir

In June 1984, water quality analysis of the Beris river water was carried out for water samples taken at 3 sits, i.e. the main dam site, the bridge in Sg. Batang village and the bridge in Kuala Beris village, with the assistance of DOE, Butterworth. Results of the analysis are shown in Table 9. According to the results, BOD and COD which are parameters of man-made pollution are very low though more than 2,000 people live in the Beris river basin. However, from the viewpoint of eutrophication, the Beris river is judged as polluted because of high phosphorus content (50 mg/lit).

To examine the possibility of eutrophication in the Beris reservoir, preliminary projection is made as follows.

Vollenweider (Ref. K 2) proposed the following equation to formulate his view that eutrophication in a reservoir/lake would occure in relation to phosphorus concentration, average depth and storage period in a reservoir/lake based on actual observation records as shown in Fig. 4.

$$Lc = Pc\ (Z/Tw + 10)$$

where, Lc : Critical loading level for phosphorus ($g/m^2 \cdot y$)
Pc : Critical concentration for phosphorus (mg/m^3)
Z : Average depth of a reservoir (m)
Tw : Storage period in a reservoir (y)

Degree of eutrophication can be classified into 3 levels, i.e. eutrophication, mesotrophication, and oligotrophication levels, based on the relation among Pc, Z/Tw and L as shown in Fig. 4. Degree of eutrophication in the proposed Beris reservoir is presumed by the following procedure using the result of water quality analysis.

Conditions : Total storage volume (V) = $111 \times 10^6\ m^3$
Annual inflow (I) = $109 \times 10^6\ m^3/y$
Surface area (A) = $13 \times 10^6\ m^2$
Phosphorus concentration (P) = $30\ mg/m^3$

Calculation : Average depth (Z) = V/A = 8.54 m
Storage period (Tw) = V/I = 1.02 y
Z/Tw = 9.38/1.38 = 8.4 m/y
$L = P \times I/A = 0.25\ g/m^2 \cdot y$

Result : The points of Z/Tw = 8.4 and L = 0.25 dotted on Fig. 4 is located in the mesotrophicated zone near the oligotrophicated zone.

Therefore the proposed Beris reservoir will be free from eutrophication. However, if vegetation in the proposed Beris reservoir is not cleared well before impounding, there is a possibility to be a eutrophicated reservoir. Because decomposition of organic matters which are sources of eutrophication is proceeded by the activity of aerobic microorganism with dissolved oxygen. And the remaining vegetation in a reservoir causes the reduction of dissolved oxygen.

(3) Archaeological and historical assets

According to the Archaeology Museum in Merbok, any investigation on archaeological and historical assets has not been carried out in the area to be affected by the construction of the Beris dam. Although any findings of archaeological and historical assets have not been reported to far, if these assets are found during the construction of the dam, the findings should be reported to the National Museum in Kuala Lumpur. Based on the judgement by the National Museum, the construction work may be stopped, if necessary.

(4) Water borne diseases

There has been no reported case of water borne diseases such as cholera, dysentery, salmonellosis, amoebic dysentery and others, in the vicinity of the existing reservoirs. There will be no possibility of occurrence of water borne diseases due to creation of the Beris reservoir.

REFERENCES

K 1. PERLIS-KEDAH-PULAU PINANG REGIONAL WATER RESOURCES STUDY PART 1, ANNEX P, February 1984, JICA

K 2. MALAYAN ANIMAL LIFE, 1954, M.W.F. Tweedie and J.L. Harrison

TABLES

Table 1. PRESENT LAND USE IN THE PROPOSED BERIS RESERVOIR AREA

Land Use	Unit	Maximum Water Level (El. m) 1/			
		79.7	85.7	87.7	90.7
1. Rubber	ha	238.5	429.5	491.8	593.3
2. Paddy	ha	69.2	124.8	143.0	172.2
3. Residential and Mixed Cultivation Land	ha	123.1	223.9	261.2	304.7
4. Forest					
4.1 Unalienated	ha	249.7	488.5	560.9	673.3
4.2 Alienated	ha	80.0	122.1	140.2	168.3
Total Land Area	ha	760.5	1,388.8	1,597.1	1,911.8
5. Houses					
5.1 Batu Seketul Village	nos.	13	44	54	55
5.2 Sg. Batang Village	nos.	102	198	231	245
5.3 Terenas Village	nos.	41	49	51	55
Total of item 5		156	291	336	355
6. Public Facilities					
6.1 Mosque	nos.	1	1	1	1
6.2 School	nos.	1	1	1	1
6.3 Place of Worship	nos.	2	2	2	2
6.4 Storehouse	nos.	2	2	2	2
6.5 Public House	nos.	1	1	1	1
6.6 RISDA Hospital	nos.	1	1	1	1
6.7 Small Public House	nos.	1	1	1	1
6.8 Cemetery	nos.	1	1	1	1

Remark; 1/: Maximum Water Level = Normal High Water Level + 2.7 m (flood storage)

Table 2. NUMBER OF HOUSES SUBMERGED UNDER THE PROPOSED BERIS RESERVOIR

Unit: nos.

Village/Class	Maximum Water Level (El. m) 79.7	85.7	87.7	90.7
A. Batu Village				
1. Class A	1	3	7	7
2. Class B	5	28	33	34
3. Class C	7	13	14	14
Sub-total	13	44	54	55
B. Sg. Batang Village				
1. Class A	1	8	11	14
2. Class B	67	144	172	182
3. Class C	34	46	48	49
Sub-total	102	198	231	245
C. Terenas Village				
1. Class A	-	-	-	-
2. Class B	30	38	40	44
3. Class C	11	11	11	11
Sub-total	41	49	51	55
Total: A to C	156	291	336	355

Remark; Illustration of houses by class is shown in Fig. 1.

Table 3. UNIT PRICE OF LAND, HOUSES AND PUBLIC FACILITIES

Land Use	Unit	Unit Price
1. Rubber	M$/ha	20,000
2. Paddy	M$/ha	25,000
3. Residential and Mixed Cultivation Land	M$/ha	25,000
4. Alienated Forest	M$/ha	10,000
5. Houses		
5.1 Class A	M$/no.	20,000
5.2 Class B	M$/no.	12,000
5.3 Class C	M$/no.	5,000
6. Public Facilities		
6.1 Mosque	M$/no.	120,000
6.2 School	M$/no.	290,000
6.3 Place of Worship	M$/no.	30,000
6.4 Storehouse	M$/no.	40,000
6.5 Public House	M$/no.	40,000
6.6 RISDA Hospital	M$/no.	40,000
6.7 Small Public House	M$/no.	10,000
6.8 Cemetery	M$/no.	50,000

Table 4. ESTIMATED LAND ACQUISITION COST FOR THE PROPOSED BERIS RESERVOIR AREA

Unit: M$10^6

Land Use	Maximum Water Level (El. m) 79.7	85.7	87.7	90.7
A. Land				
1. Rubber	4.77	8.59	9.84	11.87
2. Paddy	1.73	3.12	3.57	4.31
3. Residential and Mixed Cultivation Land	3.08	5.60	6.53	7.62
4. Alienated Forest	0.80	1.22	1.40	1.68
Sub-total	10.38	18.53	21.34	25.48
B. Houses				
1. Batu Seketul Village	0.12	0.47	0.61	0.62
2. Sg. Batang Village	0.99	2.12	2.52	2.71
3. Terenas Village	0.42	0.52	0.54	0.59
Sub-total	1.53	3.11	3.67	3.92
C. Public Facilities				
1. Mosque	0.12	0.12	0.12	0.12
2. School	0.29	0.29	0.29	0.29
3. Place of Worship	0.06	0.06	0.06	0.06
4. Storehouse	0.80	0.80	0.80	0.80
5. Public House	0.40	0.40	0.40	0.40
6. RISDA Hospital	0.40	0.40	0.40	0.40
7. Small Public House	0.01	0.01	0.01	0.01
8. Cemetery	0.05	0.05	0.05	0.05
Sub-total	0.69	0.69	0.69	0.69
Total: A to C	12.60	22.33	25.70	30.09

Table 5. ESTIMATED LAND ACQUISITION COST FOR THE PROPOSED TAWAR-MUDA RESERVOIR AREA

Unit: $M\$10^6$

Land Use		Amount
A.	Land	
	1. Rubber	
	1.1 RISDA & private	11.3
	1.2 FELCRA	2.1
	Sub-total	13.4
	2. Paddy	0.3
	3. Upland	0
	4. Residential Land/Quarter (Aur Village)	0.3
	Total	14.0
B.	House	
	1. Aur Village	0.4
Total:	A and B	14.4

Table 6. ESTIMATED RESETTLEMENT COST

	Description	Unit	Quantity	Unit Price (M10^3)	Amount (M10^3)
1.	Land Acquisition Cost				
	1.1 Rubber Farm	ha	300	20	6,000
2.	Development Cost				
	2.1 Resettlement Area	ha	400	12	4,800
	2.2 Rubber Field in Forest Reserve	ha	500	6	3,000
	Sub-total				13,800
3.	House	nos.	334	12	4,008
4.	Public Facilities				
	4.1 Mosque	nos.	1	120	120
	4.2 School	nos.	1	290	290
	4.3 Place of Worship	nos.	2	30	60
	4.4 Storehouse	nos.	2	40	80
	4.5 Public House	nos.	1	40	40
	4.6 RISDA Hospital	nos.	1	40	40
	4.7 Small Public House	nos.	1	10	10
	4.8 Cemetery	nos.	1	50	50
	Sub-total				690
	Total				18,498

Table 7 ECONOMIC NET PRODUCTION VALUE OF AGRICULTURAL PRODUCTS

Unit: M$/ha

	Amount
Paddy	170
Rubber	1,300
Mixed Horticulture	100
Forest : Alienated	650
Unalienated	33

Table 8 ESTIMATED PRODUCTION FORGONE IN THE PROPOSED BERIS RESERVOIR AREA

Unit: $M\$10^3$

Item	Maximum Water Level (El. m)			
	79.7	85.7	87.7	90.7
1. Paddy	12	21	24	29
2. Rubber	310	558	639	771
3. Mixed Horticulture	12	22	26	30
4. Alienated Forest	20	79	91	109
5. Unalienated Forest	8	16	19	22
Total	362	696	799	961

Table 9 WATER QUALITY ANALYSIS SAMPLED IN THE BERIS RIVER BASIN

Unit: mg/l except pH

	Locations		
	The Beris Main Dam Site	The Bridge in Kg. Sg. Batang	The Bridge in Kg. Kuala Beris
pH at 26°C	7.2	7.4	7.1
BOD 5 days at 20°C	1	1	1
COD	5	10	5
Ammoniacal Nitrogen	0.01	0.17	0.12
Total Kieldahl Nitrogen as N	0.69	0.66	0.63
P	0.05	0.03	0.03
Total Solids dried at 105°C	35	50	45
Suspended Solids dried at 105°C	20	25	25
Disolved Solids	15	25	20
Fe	0.70	0.60	0.70

Table 10 FEATURE OF WILD ANIMALS IN THE BERIS RESERVOIR AREA

(1) Common Wild Pig: This is the only one of the larger animals that can really take care of itself without any protection from the game laws. It is common in jungle and thrives also in scrub and on the fringes of cultivation.

(2) Leaf Monkey: This monkey has longer tail, longer hair and eats only leaves. The hair on the head is particularly long and often stands up looking like a cap.

(3) White-handed Gibbon: This is the species commonly kept as a pet and which can be heard loudly and musically shouting in almost any fair-sized patch of forest.

(4) Long-tailed Porcupine: This is quite small, the size of a large rat, and has short spines and a fairly long tail which also has a brush of hairs, but they are not flattened.

(5) Common Palm Civet: This is a very common animal and is found in forest but often lives in garden trees.

(6) Malay Civet: Its body is about two feet long, coloured grey with closely set black spots. The markings on the throat are distinctive, three parallel black stripes on a white ground.

(7) Samber Deer: This is a big animal, about four feet high at the shoulder, and is found in jungle, singly or in parties of two or three. This deer sometimes do damage by nibbling the bark up rubber trees.

(8) Barking Deer: This deer is smaller, about the size of a goat, and the antlers are short and branch only once, forming a simple fork. The English name is taken from the call, which is made by both sexes and sounds rather like the bark of a dog.

(9) Lesser Mouse Deer: This is not really deer, and has the distinction of being the smallest of all the hoofed mammals. It has no horns or antlers, rather rounded bodies and tiny slendar hooves.

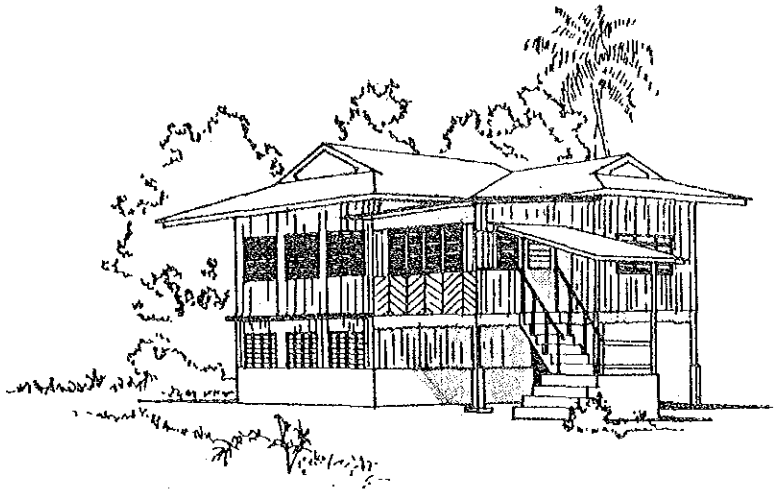
(10) Tiger: The largest and most formidable carnivore is the Tiger. A tiger is an immensely powerful beast for its size (the body is seldom more than 5 feet long) and it quite capable of killing a buffalo. Its principal food is undoubtedly the common and destructive wild pig.

(11) Leopard: This is smaller than the Tiger, the body not more than 4 feet long. Typically leopards are towny marked with black spots, each formed of a group of smaller spots in a ring.

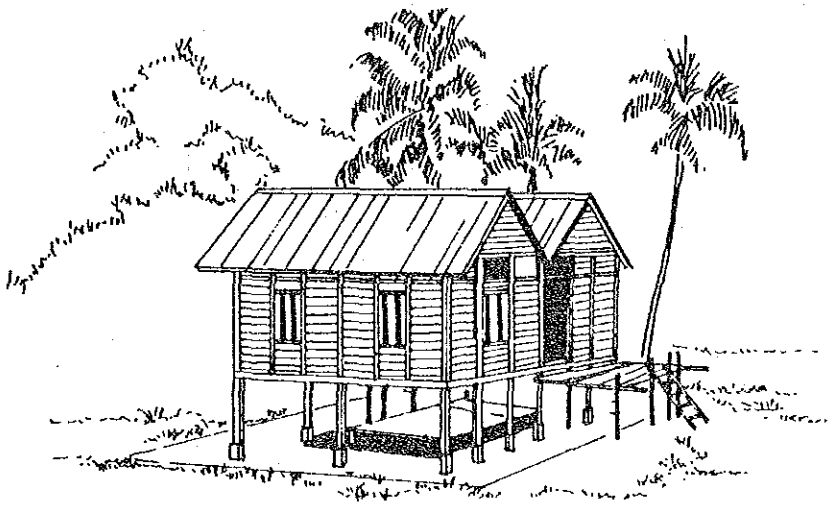
Source; Ref. K 2

FIGURES

Class A



Class B



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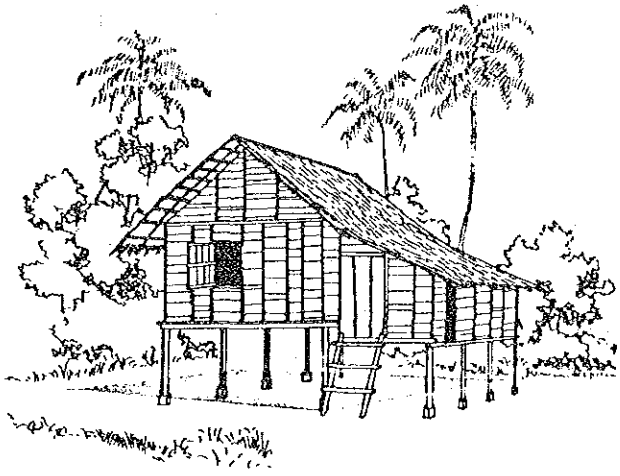

Fig. 1 Illustration of Houses by Class

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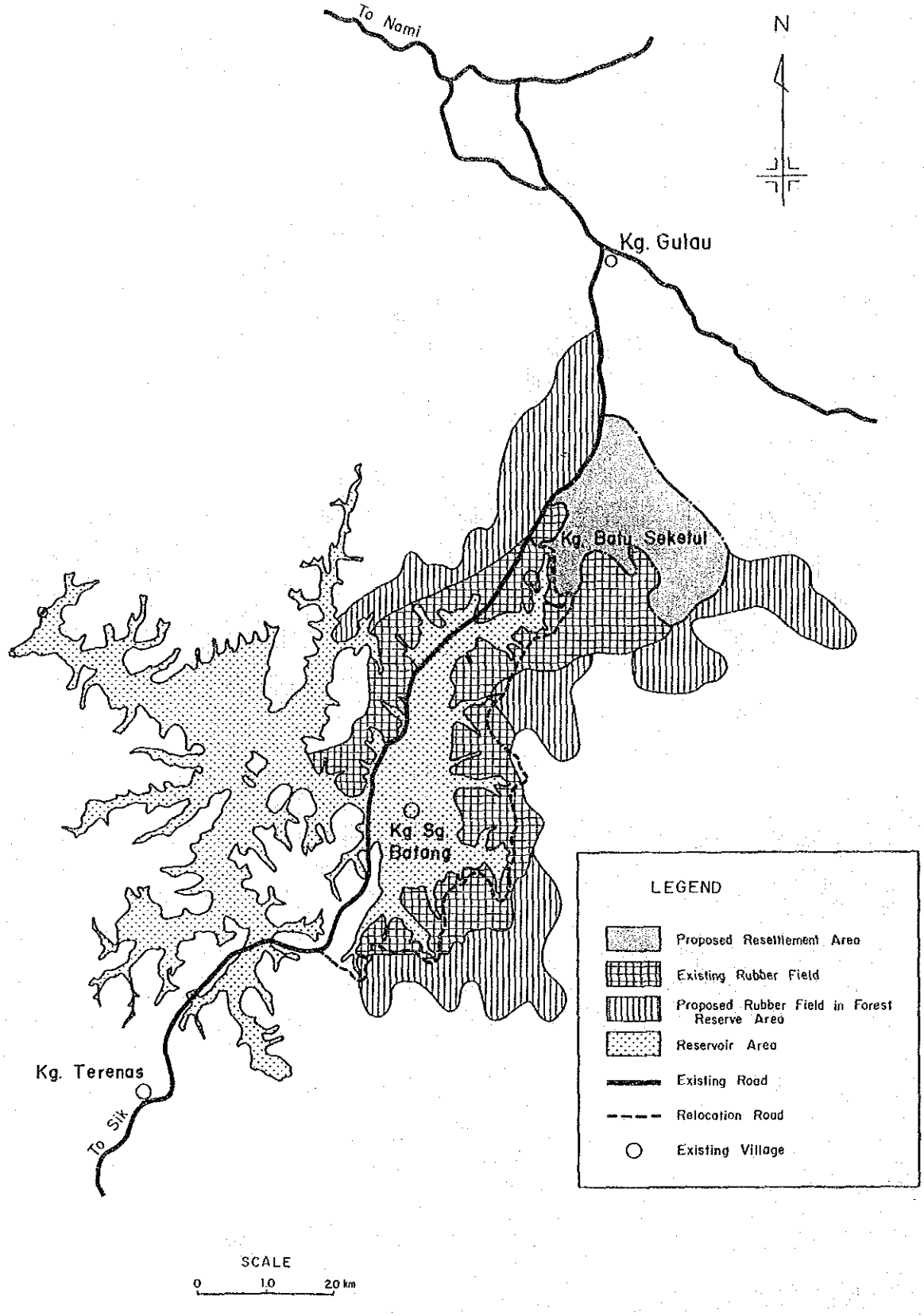

Fig. 2 Plan of Relocation Road, Resettlement Area, Presnt and Potential Rubber Fields

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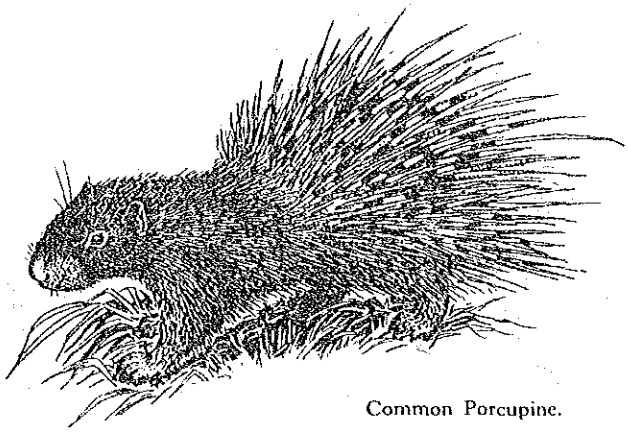
White-handed Gibbon.



Common Porcupine.

Dusky Leaf Monkey.

Source : Ref. K 2

Fig. 3 Typical Wild Animals in and around the Proposed Beris Reservoir Area

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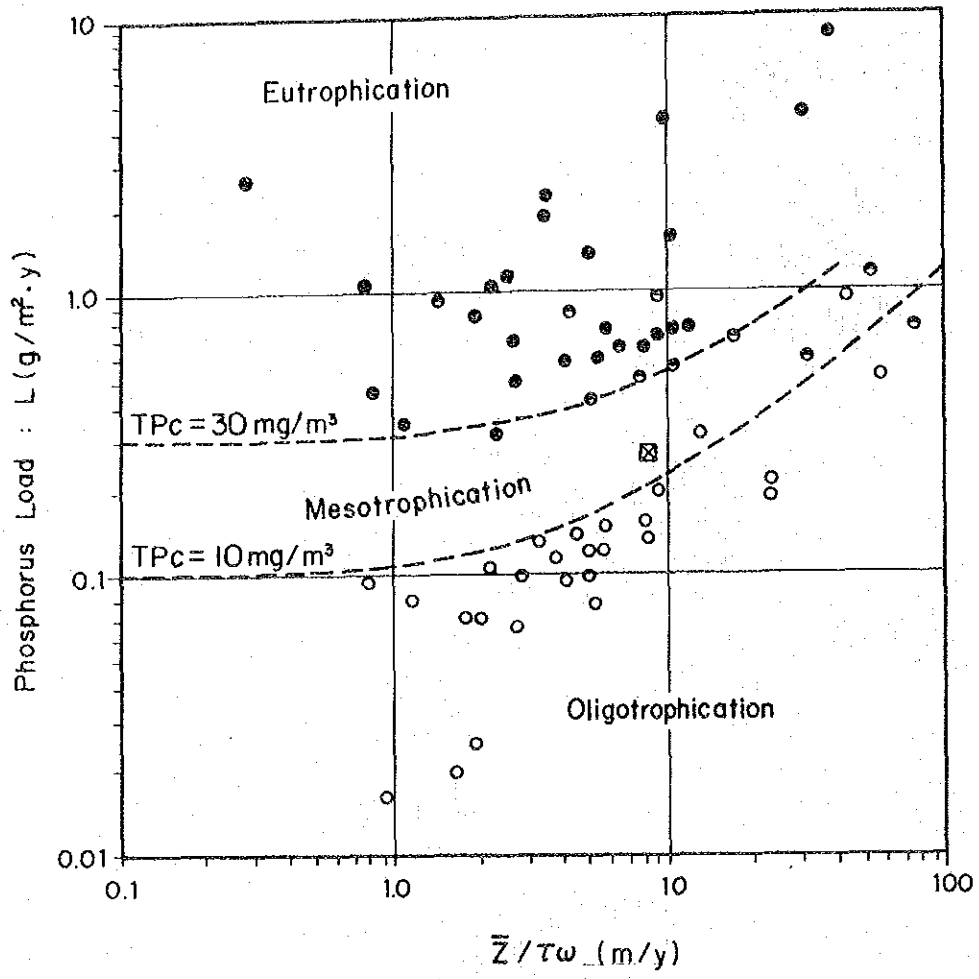

LEGEND

- ● : Eutrophicated Lake or Reservoir
- ◓ : Mesotrophicated Lake or Reservoir
- ○ : Oligotrophicated Lake or Reservoir
- ⊠ : The Proposed Beris Reservoir

Fig. 4 Distribution of Eutrophicated, Mesotrophicated and Oligotrophicated Lakes or Reservoirs

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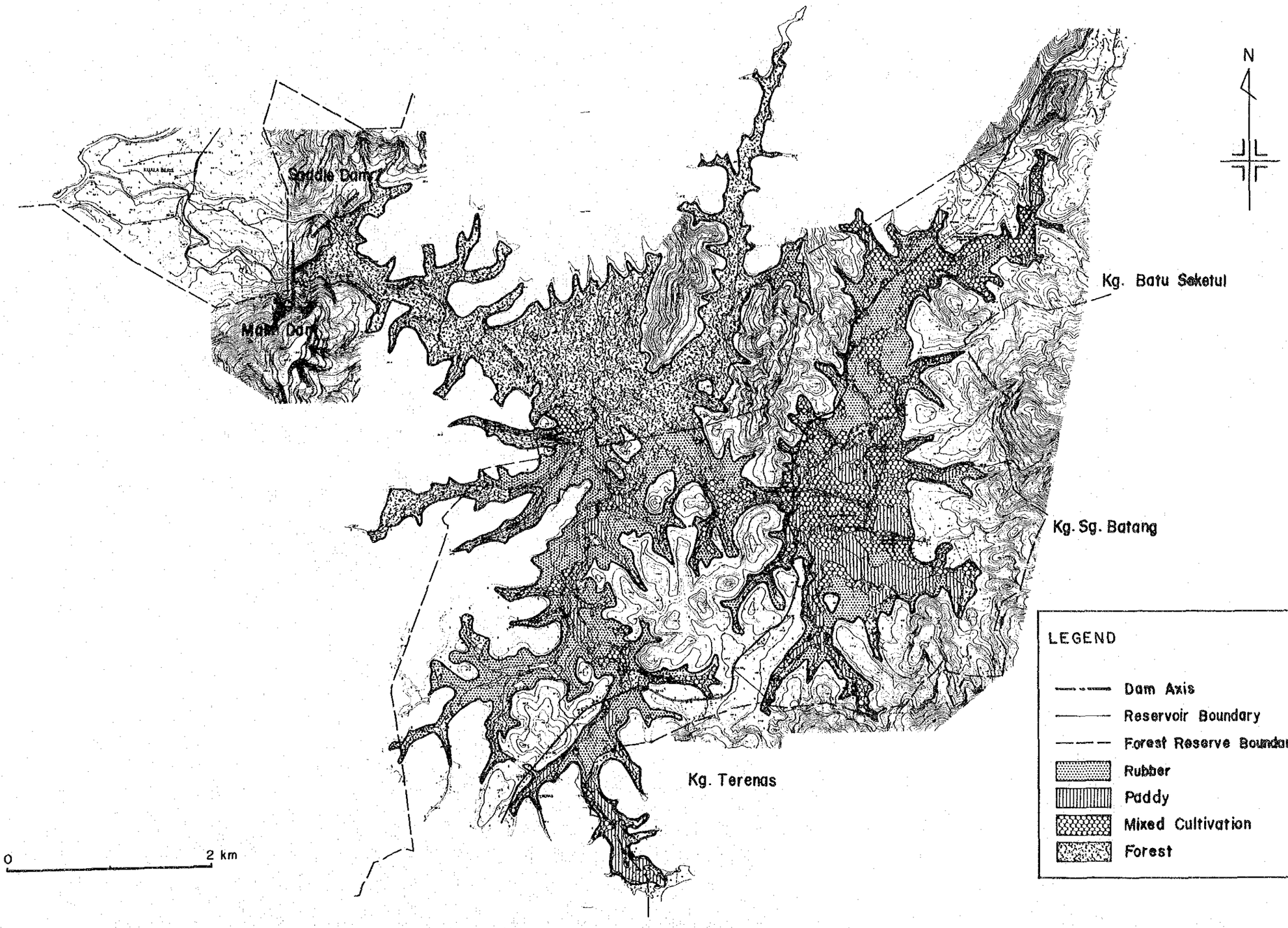
PLATES

PLATE NO. 1



Present Land Use in Proposed Reservoir Area

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ANNEX L

LEGAL AND INSTITUTIONAL ARRANGEMENT

TABLE OF CONTENTS

1. CONSIDERATION ON THE INTERSTATE RIVER MANAGEMENT

The Federal Constitution provides that the interstate river becomes under Federal legislative and executive power, if there is no agreement. There is a number of interstate rivers within the Region, however, there is no agreement except one - Kerian river.

The Waters Enactments and Mining Enactments of the States provided that the river water is a property of the State. The interstate river is not an exception. It must be considered to what extent the Federal Government has legislative and executive power.

The ownership of water in the interstate river belongs to the respective States unless the Federal law provides otherwise. The provision of Waters Enactment do not become invalid, because the law was enacted long before the establishment of Federal Constitution, which also ensure transitional effectiveness of existing laws.

However, the ownership of the river water is a little different from other goods or properties. River water always flows across the State boundary and it is difficult to control exclusively. The State Government only has a power to admit use of river water by someone within the State. State Governments cannot independently determine the amount of water to be taken from the interstate river. If the agreement is not formed, the Federal Government may have the power to determine the water allocation.

As there is no precedence that the Federal Government took any direct administrative action regarding the interstate river, it is not clarified to what extent the Federal Government has the power to control activities. The actual steps to fulfil Federal power will be as follows:

(1) The Federal Government may determine supply capacity and distribute it among the States.

A standard of safe supply shall be determined by the Federal Government uniformly throughout a basin. After that, considering socio-economic condition, the Federal Government shall determine water allocation. As a matter of fact, the Federal Government has to consult with State Governments before the determination of safety and allocation. The rights to utilize water shall be equal among the States. If there is a drought, every State has to endure equitably.

(2) The State Government can reallocate water among uses.

Each State Government shall have the responsibility to dispose allocated river water so as to maximize its contribution to the Regional socio-economic development. The State Government may issue water use licences for "private" users according to the provision of Waters Enactment. The State Government may also give consent to the governmental water use projects, both for State and Federal.

(3) The Federal Government may control water consuming projects.

Although the Federal Government cannot directly restrict private water uses, the Federal Government may take actions - if necessary court actions - to control water intakes by the governmental, State as well as Federal, agency if those water uses are against previously determined allocation and there is a significant adverse effect on the water use by the other State. As a matter of fact, many State projects rely on the Federal financial source. Therefore the Federal Government may set priority among projects from the viewpoint of water demand and supply balance.

(4) The Federal Government may coordinate the water resources development projects.

The Federal Government may coordinate to combine two or more projects into a multipurpose project. The Federal Government may have the power to coordinate development of source facilities beyond the State boundary.

(5) The Federal Government may take actions in case of drought.

When the drought occur, each State has to reduce its water intake. It will be the user in downstream reaches that suffer from the drought, when there is no control. Therefore the Federal Government shall have power to regulate water takings in upstream area.

No law will be required to endow the above-mentioned executive power to the Federal Government, for it just determines the relation among Federal and State Governments. Also no special Federal-States agreement will be necessary, for this is within a provision of the Federal Constitution.

2. ADDENDUM OF DRAFT MASTER AGREEMENT

The Draft Master Agreement in Appendix A of Annex Q of the Final Report of Part 1 Study shall be amended as follows:

1. Interpretation

Second paragraph is totally deleted and replaced by the following paragraph:

"the Corporation" means the National Water Resources Development and Management Corporation or, until the said National Corporation is established, an agency so designated by the Federal-State Committee.

After the end of the last paragraph, the following paragraph is added:

"the Federal-States Committee" means a committee established in accordance with the provision in Article 6.

2. Principle

Paragraphs (3) and (4) are totally deleted and replaced by the following three paragraphs:

(3) The Federal and State Governments shall plan and execute water resources development so that the dependability of water will not be reduced from a reasonable level.

(4) Anyone who causes the water deficit shall be responsible to bear the development cost of the source facilities. The Federal and State Governments are responsible to undertake necessary financial arrangement for the development of required source facilities.

(5) Domestic and industrial water use shall be given priority over irrigation water use. Irrigation projects in tributary basins shall be given priority over irrigation projects in the main stream.

4. Water Use

In the first line of paragraph (5), the ward interstate is deleted and replaced by the ward Federal-States.

7. Federal-States Committee

Article 7 is newly established as follows:

(1) There shall be a Federal-States Committee. The Committee shall consists of representative of Federal Government, State Governments of Perlis, Kedah and Pulau Pinang and MADA.

(2) The Corporation shall be a secretariate for the Committee.

(3) The Committee shall have the power to determine:

a) Master Plan,

b) designation of source projects, of which implementation should be entrusted to the Corporation,

c) cost allocation,

d) to entrust operation of source facilities within the Region to the Corporation,

e) operation rule of the source facilities,

f) water rationing program in case of drought, and

g) measures in case of extraordinary drought.

(4) The bill of the Committee shall be drafted by the secretariate.

3. SAMPLE OPERATION RULE

It is recommended that Federal-States Agreements on Procedures and Methods should be made. These should be prepared based on more detailed studies. Herein an Operation Rule is presented as a sample of the Agreements.

This Agreement is made the ____ day of _____ , 19__ between the Federal Government of the first part, the Government of the State of Perlis of the second part, the Government of the State of Kedah of the third part, the Government of the State of Pulau Pinang of the fourth part and Muda Agricultural Development Authority of the fifth part.

It is hereby agreed as the Operation Rule under the due procedure provided in the Agreement dated ____ of _____ , 19__ as follows:

(1) The Corproation shall establish monitoring points of river water at main points in the river system.

(2) The Corporation shall announce the operation plan for the coming 12 months on the first of February every year.

(3) The procedure to determine the operation plan shall be as follows:

  (i) to collect information of the water demand from each water user at the beginning of every year,

  (ii) to prepare demand tables at the monitoring points on 5-day basis throughout the year,

  (iii) to determine the planting area of off-season crop in MADA area by referring to the water level of Pedu reservoir on February 1 and to amend the planting area on April 1, if the drawdown of the Pedu reservoir during March is larger than a pre-determined depth, and

  (iv) to notify the water supply schedule on 5-day basis to water users.

(4) MADA shall adjust the water demand for the coming 5-day period according to the information of field water levels and inform the adjusted water requirement to the Corporation.

(5) The Corporation shall operate the source facilities to sustain the river discharge to meet the schedule demand at the monitoring points.

(6) The control center of the Corporation shall identify the water deficit at the monitoring points in the following procedure at the last day of a specific 5-day period:

  (i) to estimate the uncontrolled river flow available for the period at the monitoring points, and

(ii) to calculate the water deficit at the monitoring points.

(7) The control center shall determine the release from the source facilities at the beginning of the every 5-day interval in the following procedure:

(i) to determine the discharge over the Jeniang barrage to the Muda river,

(ii) to determine uncontrolled discharge to be diverted from the Muda river to MADA area by the Jeniang system,

(iii) to determine release from the Ahning dam, the maximum discharge from the Ahning dam should be _____ m^3/s,

(iv) to determine release from the Beris dam, the maximum discharge from the Beris dam should be _____ m^3/s, and

(v) to determine release from the Pedu dam to fill the remaining water deficit.

(8) The Corporation declare the drought when the water level of the Pedu reservoir falls below El. _____ m. Release from the Pedu dam shall be decreased by the pre-determined percentage and the irrigation projects along the main stream of the Kedah river shall reduce the water intakes by the same percentage. If the drought is very severe, the Corporation may refer to the Federal-States Committee for taking necessary actions.

(9) Each water user has to make water intake records and submit it to the Corporation. The Corporation shall have the power to inspect the record and water taking conditions.

(10) The operation and maintenance cost of the facilities shall be borne by the Federal Government, the State Governments of Perlis, Kedah and Pulau Pinang at the rate of : : : .

Signed for and on behalf of Federal Government:

_____

Signed for and on behalf of Government of the State of Perlis:

_____

Signed for and on behalf of Government of the State of Kedah:

_____

Signed for and on behalf of Government of the State of Pulau Pinang:

_____

Signed for and on behalf of Muda Agricultural Development Authority:

_____