

5.2 ORGANIZATION FOR OPERATION AND MAINTENANCE OF THE PROJECT

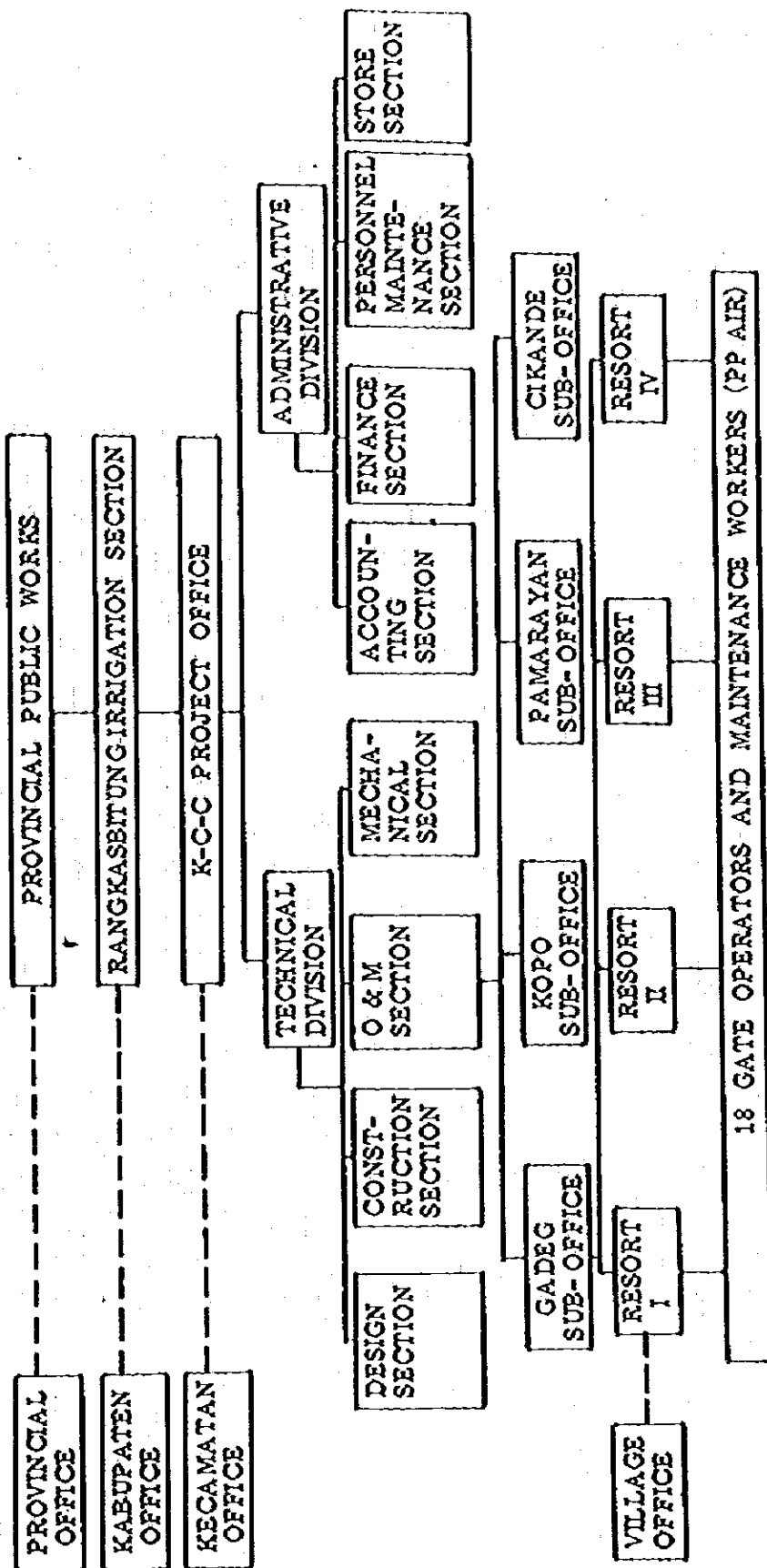
After completion of the construction work, the Project Office will be re-organized into the Project Operation and Maintenance Office under the Provincial Department of Public Works. The Project O & M Office will be responsible for operation and maintenance of all the Project facilities down to inlets of tertiary blocks. The operation and maintenance of the tertiary blocks down to terminal facilities will be entrusted to the water users' associations and farmers themselves.

The O & M Office will consist of one head office and four sub-offices. The main office and the branch offices established in the construction stage will be used as the Project O & M Office after completion of the Project construction work. The O & M Office will consist of two working divisions, i.e. Technical Division and Administrative Division. The Technical Division will have four sections; Design Section, Operation Section, Maintenance Section and Mechanical Section. The Administrative Division will also have four sections, i.e. Accounting Section, Financing Section, Personnel Management Section and Store Section.

The main office will be responsible for the overall activities necessary for proper operation and maintenance of all the Project facilities including preparation of overall O & M program, design and construction of repairing and rehabilitation works, budgeting, training of the O & M staff. The duties of each section are described in detail in Annex IX.

Fig- 17

ORGANIZATION OF PROJECT OFFICE



5.3 PROPOSED AGRICULTURAL SUPPORT SERVICES

5.3.1 General

The Project area is not fully provided with the proper agricultural support services in view of the forthcoming new farming system of irrigated agriculture. The present management of agricultural support services under the rainfed condition should be improved before the implementation of the Project.

5.3.2 Research and Extension Services

In order to ensure the present crop development program and to provide for the successful implementation of the farming, a systematic program of adaptation test of agriculture in the Project area is indispensable. The research activities at the Singamaerta experimental station should carry out experiments on cropping patterns including rice and non-rice food crops such as groundnuts, soybeans and chillies. The location of experiments would be in the Project area.

Personnel of agricultural extension service in the Project area are considered to be enough in number (a PPL covers about 600ha of rice field), but the training program for PPMs and PPLs should be strengthened by the authorities concerned. It is also desired to provide some technical testing apparatus and information instruments such as pH meter, soil auger, slide projector and motorcycle for effective activities of PPMs and PPLs.

5.3.3 Seed Multiplication and Its Distribution

When irrigation becomes available through the Project, the improvement and extension of the seed farm is necessary for the timely and sufficient supply of seed to the farmers. In this context, the staff members, facilities, fields and equipment should be strengthened before the completion of the Project works. The required amount of rice seeds will be about 180 tons per year with the Project for about 7,000ha of planted area. Seed distribution system to the farmers through BUUD/KUD or seed growers should also be improved for smooth and wide distribution of seeds.

5.3.4 Agricultural Credit

Agricultural credit system in Indonesia is divided into two channels. One is under BIMAS program and the other is out of BIMAS program. For the participation to the BIMAS program, one of the prerequisites is that the technical or semi-technical irrigation system is to be basically provided in the fields to be applied.

The BIMAS program area would be expanded and the farmers' demand for the credit would be increased with the provision of irrigation water in the Project area. It is desired, therefore, that the credit system under BIMAS program or out of BIMAS program would be strengthened by the proper guidance of the Government agencies concerned.

5.3.5 Farmers Cooperatives

Agricultural development in the country of very dense population and a very small farm holding size can not be very successful without cooperation of farmers concerned. A well organized farmers' organization can operate as a very effective liaison between farmers and development agency.

In the Project area, there exists only three BUUD/KUD out of nine village units. It is anticipated, however, that some more BUUD/KUD will be organized with the increase of agricultural production in the Project area. In this context, it is desired that the Government agencies concerned would give the guidance, assistance and facilities for more effective function of these cooperatives in the area, viz. such as: provision of education and training of cooperative managers, credit facility, marketing and processing facilities, etc.

5.3.6 Water Management

According to present practices in Indonesia, operation and maintenance of irrigation and related facilities are the responsibility of the local (provincial) government. The operation and maintenance of irrigation works including main and secondary canals in the Project area would be the responsibility of Serang Irrigation Section of the Public Works of the Province of West Java.

The operation and maintenance of on-farm facilities including tertiary canals would be the responsibility of the farmers. It is desired, therefore, that the Government agencies concerned will make necessary arrangements to establish water

users' associations in the Project area. The operation and maintenance of the village water supply facilities would be the responsibilities of users themselves under the supervision of village head and the sanitary staff in the area.

VI. COST ESTIMATE

6.1 PROJECT COST

6.1.1 Estimate of Project Cost (Financial Price)

The total investment cost of the Project is estimated at US\$35.9 million, of which about US\$13.3 million is the foreign exchange component and about US\$22.6 is the local expenditure cost. These estimates are based on prevailing price levels in December 1982. Physical contingency of 10% and an allowance for anticipated price escalation of 8% per annum for foreign currency and 15% per annum for local currency over the 4 year construction period (1984 - 1987) have been taken into account in the cost estimates. A summary of the cost estimates is shown in Table 7 (see Annex X for detailed cost estimates and tentative disbursement schedule).

6.1.2 Annual Disbursement Schedule

The annual disbursement schedule of Project cost is worked out based on the construction time schedule. The details are presented in Table 8.

Table 7

**SUMMARY OF PROJECT COST
(FINANCIAL PRICE)**

Unit: US\$103

Item	Total	Foreign Portion	Local Portion
1. Preparatory Works	1,283	290	993
2. Diversion Works	2,980	1,778	1,202
3. Canal Works	9,944	4,552	5,392
4. Tertiary Development	750	220	530
<u>Sub-total (1-4)</u>	<u>14,957</u>	<u>6,840</u>	<u>8,117</u>
5. Land Acquisition and House Evacuation	2,580	-	2,580
6. O/M Equipment	600	600	-
7. Administration Expenses	600	-	600
8. Engineering Services	1,880	1,264	616
9. Physical Contingency	2,061	870	1,191
<u>Sub-total (5-9)</u>	<u>7,721</u>	<u>2,734</u>	<u>4,987</u>
<u>Total (1-9)</u>	<u>22,678</u>	<u>9,574</u>	<u>13,104</u>
10. Price Contingency	13,261	3,706	9,555
Grand Total	35,939	13,280	22,659

ANNUAL DISBURSEMENT SCHEDULE OF PROJECT COST
(FINANCIAL)

(US\$ 10³)

Item	TOTAL		1984		1985		1986		1987	
	FC	LC	FC	LC	FC	LC	FC	LC	FC	LC
1. Preparatory Works	290	993	120	480	170	513	-	-	-	-
2. Diversion Works	1,778	1,202	-	-	52	31	851	592	-	579
3. Canal Works	4,552	5,392	-	-	-	-	2,276	2,696	-	2,696
4. Tertiary Development	220	530	-	-	-	-	110	265	110	265
5. O/M Equipment	600	-	-	-	180	-	420	-	-	-
6. Administration Expenses	-	600	-	129	-	171	-	171	-	129
7. Land Acquisition & House Evacuation	-	2,580	-	647	-	1,933	-	-	-	-
8. Engineering Services	1,264	616	271	132	361	176	361	176	271	132
Sub-total (1 - 8)	8,704	11,913	391	1,388	763	2,824	4,018	3,900	3,532	3,801
9. Physical Contingency	870	1,191	39	139	76	282	402	390	353	380
Sub-total (1 - 9)	9,574	13,104	430	1,527	839	3,106	4,420	4,290	3,885	4,181
10. Price Contingency	3,706	9,555	72	492	218	1,618	1,593	3,213	1,823	4,232
Total	13,280	22,659	502	2,019	1,057	4,724	6,013	7,503	5,708	8,413
	(35,939)		(2,521)		(5,781)		(13,516)		(14,121)	

6.2 ECONOMIC COST

Among the Project costs mentioned above, all the costs except the costs for land acquisition and price contingency are counted as the economic cost. The total economic cost and its annual disbursement schedule are as shown in the following table.

Table 9 **TOTAL ECONOMIC COST**
(Non-financial Price)

(Unit: US\$10³)

Item	Economic cost
1. Preparatory Works ^{/1}	1,228
2. Diversion Works	2,852
3. Canal Works	9,516
4. Tertiary Development & On-farm Development	1,196
Sub-total	(14,792)
5. O & M Equipment	600
6. Administration Expenses	600
7. House Evacuation ^{/2}	325
8. Engineering Services	1,880
9. Physical Contingency	1,820
Total	20,017

^{/1}: including cost for office and quarters

^{/2}: about 65 houses in the submergible area near Gadeg dam site to be evacuated

Table 10 ANNUAL DISBURSEMENT SCHEDULE OF ECONOMIC COST

US\$103

Item	Total	1984	1985	1986	1987
1. Preparatory Works /1	1,228	574	654		
2. Diversion Works	2,852	-	79	1,381	1,392
3. Canal Works	9,516	-	-	4,758	4,758
4. Tertiary Development & On-farm Development	1,196	-	-	598	598
Sub-total	(14,792)	(574)	(733)	(6,737)	(6,748)
5. O/M Equipment	600	-	180	420	-
6. Administration Expenses	600	129	171	171	129
7. House Evacuation	325	325	-	-	-
8. Engineering Services	1,880	403	537	537	403
9. Physical Contingency	1,820	143	162	787	728
TOTAL	20,017	1,574	1,783	8,652	8,008

/1: including cost for office and quarters

6.3 ANNUAL OPERATION AND MAINTENANCE COSTS

The annual operation and maintenance costs of US\$870,000 include the salaries of Project administrative and water control staffs, the materials and labour costs for repair and maintenance of Project facilities, the costs for operation, repair and maintenance of O & M equipment, and the running costs of Project facilities. These costs are estimated as 0.5% of the construction costs for Diversion Works component and 1.5% for the canal works component on the basis of experience gained from projects of similar type magnitude.

VII. PROJECT EVALUATIONS

7.1 GENERAL

The Project evaluation is carried out in order to ascertain the feasibility of the Project in view of economic, financial and socio-economic aspects.

The economic feasibility for the Project is firstly evaluated by calculating the economic internal rate of return (hereinafter referred to as the "EIRR"). Further, sensitivity analysis of EIRR is also made with respect to changes in the economic project cost, market price of rice and unit yield of rice. In the calculation, the economic costs and benefits are estimated based on the study results in ANNEX-V and X. Secondly, the financial aspect is evaluated by calculating the capacity to pay. The calculation of capacity to pay is to confirm the soundness of the Project from the farmers' viewpoint. Finally, intangible socio-economic impacts of the Project are briefly studied in due consideration of the effect of the Project on the regional development.

7.2 ECONOMIC EVALUATION

7.2.1 Basic Assumptions

The economic evaluation of the Project is made on the basis of the following assumptions: i) The Project implementation period is about 4 years from 1984 to 1987 as mentioned in ANNEX-VIII, ii) Only direct benefit is counted in the evaluation and any indirect or intangible benefits are not taken into account, iii) The current prices as of the end of 1982 are used in the evaluation, iv) The exchange rate of Indonesian Rupiah to US Dollar is taken to be Rp. 690 equivalent to US\$1, and v) The economic useful life of the Project is taken as 50 years from 1984 to 2033.

7.2.2 Economic Price

As stated in ANNEX-VI, economic farm gate prices of crop production and farm inputs are estimated based on the projected international market price

forecasted by IBRD in the long term range for 1990 based on 1981 constant US Dollars. The economic prices of the construction materials and equipment to be imported from abroad are estimated based on the CIF values in Jakarta which are converted from the present FOB prices in Japan, and cost and price related to the inland transportation between Jakarta and Serang. As for the local material, labour wages, etc. related to the construction and farming practices, the present market price is directly taken into account.

7.2.3 Project Cost

(a) Economic Cost

The Project cost broadly comprises the costs for: i) preparatory works, ii) construction of project facilities, iii) land acquisition, iv) procurement of O & M equipment (first procurement only), v) administration expenses, vi) engineering services, vii) physical contingency, and viii) price contingency.

Among the costs mentioned above, all the costs except the costs for land acquisition and price contingency are counted as the economic cost. In addition, the construction cost for the on-farm development works of US\$500,000 has been included. The total economic cost and its annual disbursement thus estimated are as shown in Table 9 and 10.

(b) Annual Operation and Maintenance Costs

The annual operation and maintenance costs are estimated as 0.5% of the construction cost for Diversion dam and 1.5% for the irrigation systems on the basis of experience gained from projects of similar type and magnitude.

(c) Replacement Costs

The replacement costs of US\$870,000 will be required for the gates of spillway and intake structure at the interval of 25 years after completion of construction works.

7.2.4 Project Benefit

The direct project benefit is evaluated as the net incremental income from the future-without-project condition to the future-with-project condition. The

benefit will come out immediately after the implementation of the Project. The benefit is expected to increase and attain its maximum level at full development stage (Table XI-3).

The anticipated annual incremental benefits of the Project are estimated in terms of economic value as shown in Table 11.

7.2.5 Economic Internal Rate of Return (EIRR)

Using the costs and benefit estimated in the above, the cost and benefit streams are firstly prepared as shown in Table 12, then the EIRR is calculated by electronic computer. The calculated EIRR is 17.4% and indicates the economic soundness of the Project.

7.2.6 Sensitivity Analysis

In order to evaluate further the soundness of the Project to the possible changes of economic conditions in future, the sensitivity analysis is made for the following critical conditions in terms of internal rate of return.

- i) cost increase due to unforeseen geological and topographical conditions and increase of material costs.
- ii) Decrease of forecasted market price of rice.
- iii) Delay in construction period.

The results of the tests are given below:

	<u>Assumptions</u>	<u>EIRR (%)</u>
(i)	Reduction in price of rice from \$403 per ton to \$380 per ton, CIF Jakarta	15.6
(ii)	Reduction in yield of rice by 10 per cent	15.4
(iii)	Two years delay in construction period	14.9
(iv)	Cost increase of 20 per cent	14.9

7.3 FINANCIAL EVALUATION

7.3.1 General

The financial feasibility of the Project is evaluated from the viewpoint of farmer's economy. In this connection, the assessment on the amount of water charge to be collected from the water users is made on preliminary basis.

7.3.2 Financial Cost

Based on the current market prices and costs as of the end of 1982, the financial cost of the Project is estimated to be US\$35.9 million equivalent comprising US\$22.6 million for the local currency and US\$13.3 million for the foreign currency as shown in Table 7. In this estimate, the physical contingency of 10%, and the price contingency of 15% per annum for local currency and 8% for foreign currency is considered to the direct cost. Table 8 shows the annual disbursement schedule of the said financial cost.

7.3.3 Capacity to Pay

For evaluating the Project feasibility from the financial aspect of farmers, typical farm budget analyses has been made under both future with project and future without project conditions as shown in Table 13.

The capacity to pay expected under the future with project condition would be Rp.176,900 per annum in 0.4ha farm in the Project area.

7.3.4 Water Charge

When the Project facilities are completed and water is released to the farmers, but if the water charge is not collected, all the costs of the Project will have to be borne by the Government, and such expenditure will become a heavy burden to the Government. It is generally understood that the water charge is imposed to the water users, and the water charges thus collected is spent for the payment of O & M expenditures incurred to the Project and for the repayment of the capital cost of the Project. In Indonesia, however, the farmers traditionally do not pay any water charge directly, but contribute indirectly by paying the IPEDA tax.

The recent Government's decree and agreements made with the international lending institutions provide the conditions that the Government shall collect the water charges from the water users and recover the entire O & M cost, and that the rate of water charge shall be reviewed and possibly increased to recover a portion of the capital cost of the Project.

The annual O & M cost required for the Project is estimated at US\$164,000 which is equivalent to about US\$47/ha. This corresponds to about 7% of the capacity to pay in 0.4ha area.

The water charge to be collected from the water users would have to be within a reasonable range in the capacity to pay that could still give sufficient incentive to the farmers. With this view, the prospective water charge is recommended to be Rp.32,000/ha/annum, i.e. the required O & M cost. This prospective water charge would be the Project revenue in the financial evaluation on the Project.

7.4. SOCIO-ECONOMIC IMPACT

In addition to the direct benefits stipulated in the economic evaluation, favourable but intangible socio-economic impacts are expected from the implementation of the Project.

7.4.1 Foreign Exchange Saving

Under the Project implementation, paddy production will increase to about 35,000 tons per annum from the present production of 12,800 tons. Out of this increased production, it is expected that the marketable rice would be about 24,000 tons after deducting the local consumption. This surplus would reduce the annual amount of imported rice, resulting in the saving of foreign exchange amounting to around US\$9.7 million equivalent.

7.4.2 Increase of Employment Opportunity to Local People

Employment opportunity to the local people will be increased by the Project implementation, and a favourable impact will be given to the national economy. Furthermore, the employee will be able to gain more experience, technical

know-how, skillfulness in the various working fields. These accumulations would be applied to the future development in West Java.

7.4.3 Improvement of Local Transportation

The local transportation will be improved much by the construction of the operation and maintenance roads along the irrigation canals. The expanded road system will not only enhance the economic activity in and around the Project area but also contribute to inter-regional accessibility and communications.

Table 11

INCREMENTAL PROJECT BENEFIT
BY YEAR OF DEVELOPMENT

Unit: 106Rp/106US\$

Year	Future With Project			Future Without Project			Incremental Benefit	
	Rice (3,500ha ²)	Palawija (3,500ha)	Total (1)	Rice (3,800ha)	Palawija (380ha)	Total (2)	Rp	US\$
1988	2,709	676	3,385	1,167	49	1,216	2,169	3,143
1989	3,115	746	3,861	"	"	"	2,645	3,833
1990	3,269	805	4,074	"	"	"	2,858	4,142
1991	3,416	805	4,221	"	"	"	3,005	4,355
1992	3,556	805	4,361	"	"	"	3,145	4,556

Table 12

COST BENEFIT STREAM (ECONOMIC PRICE)

(US\$ 1,000)

<u>Year in Order</u>	<u>Direct Cost</u>	<u>O & M Cost</u>	<u>Benefit</u>
1	1574.00	0.00	0.00
2	1783.00	0.00	0.00
3	8652.00	0.00	0.00
4	8008.00	0.00	0.00
5	0.00	164.00	3143.00
6	0.00	164.00	3833.00
7	0.00	164.00	4142.00
8	0.00	164.00	4355.00
9	0.00	164.00	4558.00
10	0.00	164.00	4558.00
11	0.00	164.00	4558.00
12	0.00	164.00	4558.00
13	0.00	164.00	4558.00
14	0.00	164.00	4558.00
15	0.00	164.00	4558.00
16	0.00	164.00	4558.00
17	0.00	164.00	4558.00
18	0.00	164.00	4558.00
19	0.00	164.00	4558.00
20	0.00	164.00	4558.00
21	0.00	164.00	4558.00
22	0.00	164.00	4558.00
23	0.00	164.00	4558.00
24	0.00	164.00	4558.00
25	0.00	164.00	4558.00
26	0.00	164.00	4558.00
27	0.00	164.00	4558.00
28	0.00	164.00	4558.00
29	0.00	1034.00	4558.00
30	0.00	164.00	4558.00
31	0.00	164.00	4558.00
32	0.00	164.00	4558.00
33	0.00	164.00	4558.00
34	0.00	164.00	4558.00
35	0.00	164.00	4558.00
36	0.00	164.00	4558.00
37	0.00	164.00	4558.00
38	0.00	164.00	4558.00
39	0.00	164.00	4558.00
40	0.00	164.00	4558.00
41	0.00	164.00	4558.00
42	0.00	164.00	4558.00
43	0.00	164.00	4558.00
44	0.00	164.00	4558.00
45	0.00	164.00	4558.00
46	0.00	164.00	4558.00
47	0.00	164.00	4558.00
48	0.00	164.00	4558.00
49	0.00	164.00	4558.00
50	0.00	164.00	4558.00
TOTAL	20017.00	8414.00	206909.00

Table 13

TYPICAL FARM BUDGET
(0.4ha Farm)

	<u>Without Project (Rp)</u>	<u>With Project (Rp)</u>
1. Gross Income	<u>223,400</u>	<u>756,000</u>
Farm income	186,200	756,000
Rainy season paddy	(172,800)	(270,000)
Dry season paddy	(0)	(270,000)
Palawija crops (Groundnut)	(13,400)	(216,000)
Other income	37,200	0
2. Expenditures	<u>199,200</u>	<u>579,100</u>
Farming expenditures	38,000	143,400
Rainy season paddy	(36,400)	(44,500)
Dry season paddy	(0)	(44,500)
Palawija crops (Groundnut)	(1,600)	(54,400)
Taxes and interest	11,200	35,700
Living expenses	150,000	400,000
3. Net Income (Capacity to pay)	<u>24,200</u>	<u>176,900</u>
	(US\$35)	(US\$256)

VIII. CONCLUSION AND RECOMMENDATION

8.1 CONCLUSION

As a result of the feasibility study as mentioned in this report, the proposed Project has been found to be technically sound, economically feasible and socially promising, and would contribute to acceleration of the regional development as well as enhancement of the living standard of the people in the Project area.

8.2 RECOMMENDATION

1. It is recommended that the proposed Project (K-C-C Irrigation Development Project -Stage I-) which has been studied based on the river flow of Cibereum river should be implemented as the first stage of the whole K-C-C Irrigation Project so as to fit the second stage K-C-C Irrigation Project which will be studied in the near future.
2. The feasibility study on the proposed Project has been carried out based on the following topographic maps;
 - 1) 1/50,000 scale with 25.0m contour intervals covering the whole K-C-C area (land use available)
 - 2) 1/5,000 scale with 2.0m contour intervals covering almost all the Project area (land use not available)
 - 3) 1/2,000 scale with 2.0m contour intervals covering southern half of irrigable area (land use not available)

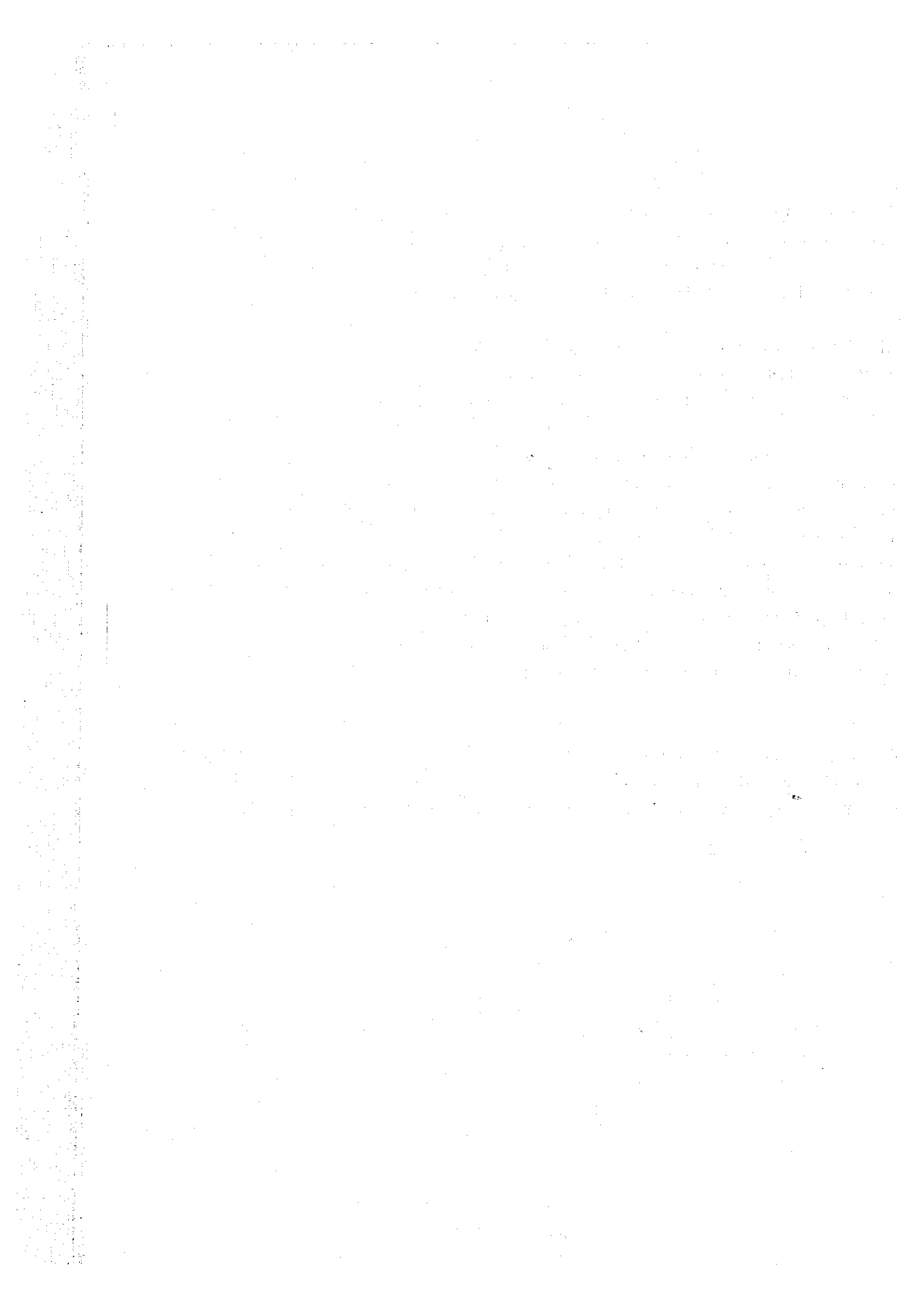
For efficient implementation of the detailed design works of the Project, topographic maps of either 1/5,000 or 1/2,000 scale with 0.5m contour intervals indicating land use (rice field, village, farmland other than rice field, non-arable land, etc.) are required.

3. In view of vital importance of meteorological and hydrological data on the water resources development, it is urgently needed to carry out the periodical measurement of river runoff on the Cibereum and to establish additional meteorological and hydrological stations to obtain reliable data.

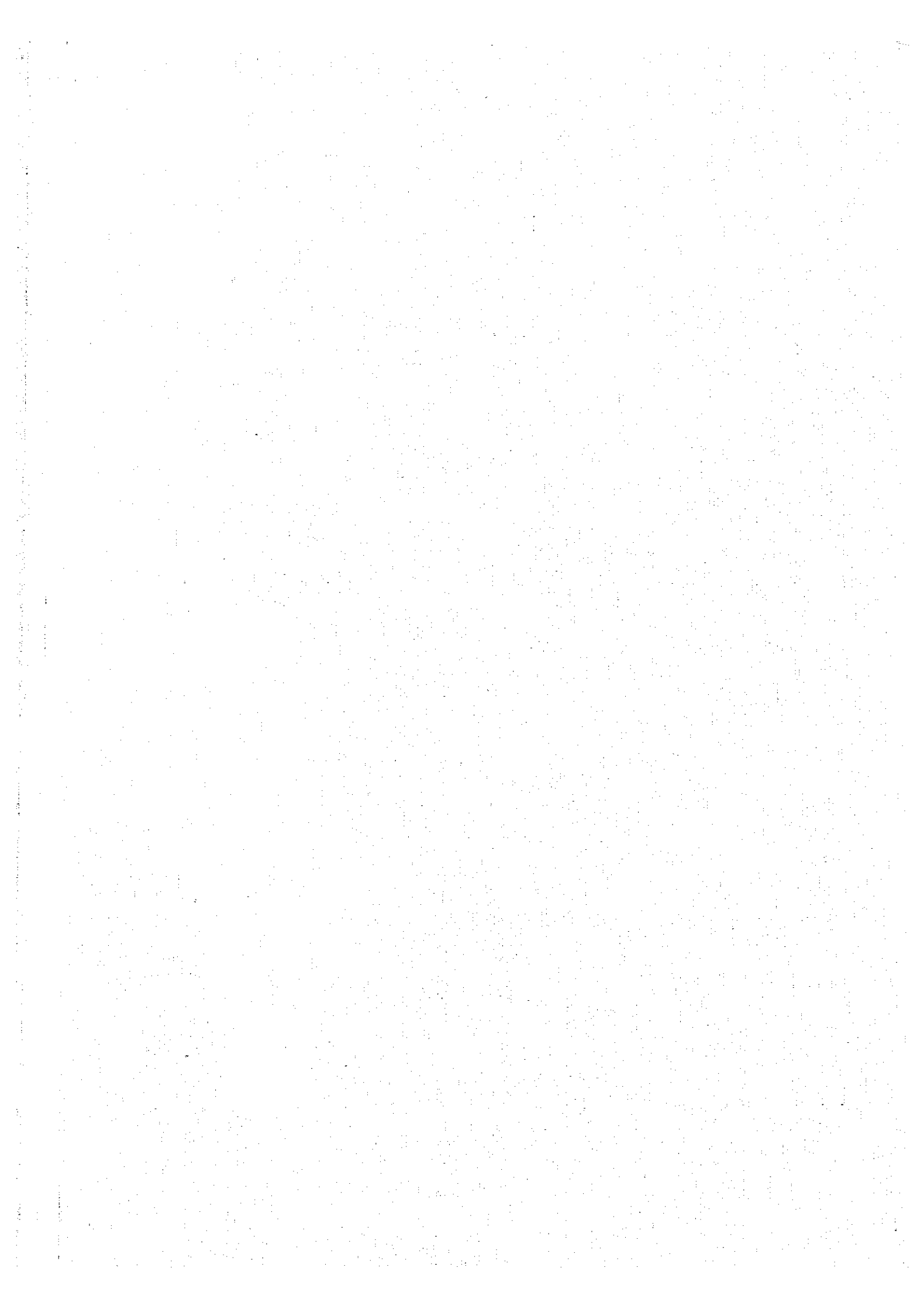
4. For effective implementation of the detailed design works of the Project, further test drillings are required to be carried out to investigate geological and soil-mechanical conditions at the proposed dam site and other related sites.

5. In order to exploit the full potential of the lands for agricultural development, rather intensive cropping pattern of rice-rice-palawija a year has been proposed, which require more improved farming practices with careful water management. For the successful introduction of the proposed cropping pattern and its water management to the farmers in the Project area, present institutions for agricultural support services have to be strengthened through the training of staff and budget allocation, and at the same time, water users' association is required to be established in the Project area under guidance of agricultural extension services. In addition to it, cooperative movement is to be enhanced through effective extension services.

6. Proper management system of operation of spillway gates is required to be established at the proposed dam site using operation manuals to avoid the mal-operation of the gates which would endanger the dam and the population living downstream.



APPENDICES



SCOPE OF WORK
FOR
THE STUDY
ON
THE NORTH BANTEN WATER RESOURCES DEVELOPMENT PROJECT

I. OBJECTIVES OF THE STUDY

The objectives of the Study are to conduct a Master Plan Study with a view to promoting a comprehensive approach to North Banten Water Resources Development Project by the year 2000 (M/P) and to conduct a Feasibility Study with a view to promoting an efficient approach to urgent Kopo-Cikande-Carenang Irrigation Project (F/S).

II. SCOPE OF THE STUDY

1. Master Plan Study

1.1. Main components of the study

1.1.1. To prepare a master plan on the water resources development in the Ciujung and Cibanten river basins up to the year 2000. The beneficial area will be mainly irrigation areas. This part also includes a study on flood control.

1.1.2. To prepare a master plan on the water supply for the Cilegon - Merak Industrial Area up to the year 2000.

1.2. Remark

The Study on the above-mentioned two main parts will be carried out taking into consideration the followings :

- (1) Groundwater Development
- (2) Soil Conservation
- (3) Environmental problems as necessary.

1.3. Detailed scope of the Study is as follows :

- (a) Collection and evaluation of hydrological and hydraulic data and analysis of available low water discharge and flood discharge and hydrograph especially assessment of the result of the reconnaissance study of the Binnie and Partners in hydrological aspects.
- (b) Examination of flood damage in the river basins, estimation of carrying capacity of river channels, and examination and evaluation of flood control schemes.
- (c) Examination of the capacity of power generation and assessment of the power energy and energy requirements of the electrical system including transmission facilities and the need for additional peaking capacities.
- (d) Evaluation of present land use and land capability of the area based on the material available.
- (e) Determination of the irrigable area and identification of major rehabilitation works for existing irrigation systems and the need for construction of new irrigation facilities, taking into consideration the calculation of irrigation water requirement based on the most suitable cropping patterns.
- (f) Analysis of available water resources of the basins by the construction of dams, taking into consideration the examination of hydrological, geological and topographical factors as well as social and economic condition.
- (g) Analysis and evaluation of the overall water balance in the basins. The study will include alternative studies on the optimum combinations of new irrigation system constructions, irrigation rehabilitation works and other purposes.
- (h) Assessment of the water demand in the industrial area.

- (i) Examination of the available water resources from the Cidanau river taking into consideration the development and environmental situation in the Rawa Danau.
- (j) Assessment of the existing pipe line capacity for the water transmission.
- (k) Examination of the possibility of water supply resources and evaluation of introducing water from the Cibanten river or Ciujung river if necessary.
- (l) Formulation of a master plan by the year 2000 for the comprehensive water resources development including preliminary design, cost estimate and implementation schedule based on the economic and social evaluation.

2. Feasibility Study

The area proposed for the feasibility study on irrigation and agriculture development consists of three kecamatans, namely Kopo, Cikande and Carenang.

The potentially irrigable area, which is about 9,500 ha, lies between the Ciujung and the Ciderian.

The study will be carried out in order to verify the feasibility of irrigation and agriculture development in the Kopo-Cikande-Carenang area focusing on the potentially irrigable land.

The activities to be undertaken by the study team will be as follows.

2.1. To collect and review relevant data and information on the following items.

- (a) Topography
- (b) Hydro-meteorology
- (c) Geology
- (d) Agriculture
- (e) Soil
- (f) Agro-economy

2.2. To carry out field investigations and surveys on the following items.

(a) Topographic Survey

- Intake structure site
- Major irrigation and drainage structure sites
- Check survey of the elevation of main canal alignment
- Profile survey of major irrigation canals

(b) Hydro-meteorological Survey

- Discharge measurement on the river relevant to the project
- Analysis of run-off mechanism and sediment discharge

(c) Geological Survey

- Geological analysis of foundation at the intake site

(d) Irrigation and Drainage Survey

- Inventory survey of existing irrigation and drainage systems
- Measurement on consumptive use at on-farm level, return flow and conveyance losses in irrigation canals

(e) Soil Mechanical Survey

- Tests of bearing capacity at major irrigation and drainage canals
- Boring tests along main irrigation canals
- Soil mechanical tests for canals

(f) Construction Material Survey

- Availability and quantities of concrete aggregates, masonry, embankment materials and other construction materials.

(g) Soil and Land Classification Survey

- Soil profile survey at a density of one pit per about 200 ha
- Physio-chemical analysis on representative soils
- Preparation of soil and land classification maps

(h) Agriculture and Agro-economic Survey

- Farm budget survey on representative farmers
- Analyses of farming practice and production, and existing institutional support systems
- Data collection on current market flows and prices of agricultural products
- Preparation of a land use map

2.3. To carry out the following analyses and studies, and prepare basic designs in the office.

- (a) Selection of crops and formulation of cropping patterns
- (b) Recommendation of improved irrigation farming practices
- (c) Estimation of irrigation and drainage requirements
- (d) Delineation of the irrigation area
- (e) Preliminary designs of irrigation and drainage systems
- (f) Preparation of the implementation schedule of the project
- (g) Assessment of farmers' economy and cost-benefit analysis of the project.

III. REPORT

1. Master Plan Study

1.1. Inception Report

Thirty (30) copies of Inception Report in English will be prepared within one month after the commencement of the study, covering the evaluation on existing data, major findings, the incentive approaches for the study, the proposed plan of operation and so on.

1.2. Interim Report

Thirty (30) copies of Interim Report in English will be prepared within three months after the commencement of the study. The study will cover all study and analysis carried out including major findings and the alternatives to be analysed in details.

1.3. Draft Final Report

Thirty (30) copies of Draft Final Report in English will be prepared within eight months after the commencement of the study. The draft Final Report will cover all the study and analysis with enough supporting data.

The review meeting will be held in Indonesia one month after the submission of Draft Final Report.

1.4. Final Report

Thirty (30) copies of Final Report will be submitted after two months of the review meeting.

2. Feasibility Study

2.1. Inception Report

Thirty (30) copies of Inception Report in English will be submitted to DGWRD one and a half months after the commencement of the study.

2.2. Interim Report

Thirty (30) copies of Interim Report in English will be submitted to DGWRD at the end of the field works.

2.3. Draft Final Report

Thirty (30) copies of Draft Final Report in English will be submitted to DGWRD at the end of the office works in Japan.

2.4. Final Report

Thirty (30) copies of Final Report in English will be submitted to DGWRD three months after Draft Final Report have been presented.

IV. UNDERTAKING OF THE GOVERNMENT OF INDONESIA

The Government of Indonesia through the Authorities concerned for the conduct of Master Plan Study and Feasibility Study, will undertake the following.

1. The Government of Indonesia shall be responsible for dealing with claims which may be brought by third parties against the members of the Japanese Study Team and shall hold them harmless in respect of claims or liabilities arising in the course of or otherwise connected with the discharge of their duties in the implementation of the Study, except when such claims or liabilities arise from the gross negligence or wilful misconduct of the above-mentioned individuals.
2. The DGWRD shall, at its own expense, provide the following:
 - (1) Available data and information related to the Study
 - (2) Ground Survey as indicated in APPENDIX.
 - (3) Counterpart personnel (Project Manager, Officials, Engineer, Typists and other personnel necessary for the Study).
 - (4) Suitable office space
 - (5) Appropriate number of vehicles with drivers
3. DGWRD shall make the necessary arrangements for the followings:
 - (1) Recommendation of local consultants firm for survey if necessary.
 - (2) Securing permission for entry into private properties and other areas necessary for the conduct of the Study.

(3) Sending the following existing data to Japan

(a) Topographic map of Karian dam sites (4 km²) in the scale of 1/2,000 and with the 2 m contour line by the end of March, 1982,

(b) All of existing data in the whole study area

i) hydro-meteorological data

-- rain fall (daily)

-- discharge & water level on low water discharge and flood discharge.

-- flood damage in every year at least flood in the year of 1914, 1942, 1981.

-- data on inland water.

ii) aerophotograph scale 1/20,000

iii) topographical map scale 1/25,000 or 1/50,000

iv) geological map scale 1/200,000 1/500,000

by the end of May, 1982.

4. The DGWRD shall make the necessary arrangements with proper agencies concerned.

(1) To ensure the safety of the study team,

(2) To provide the necessary facilities to the Japanese Study Team for the remittances as well as utilization of funds introduced into Indonesia from Japan in connection with the implementation of the Study.

(3) To exempt the Study Team from taxes, duties, fees and other charges on machinery, equipment and other material brought into Indonesia for the conduct of the Study.

(4) To secure clearance for the release of the aerial photograph,

(5) To allow to take all data and documents related to the Study including photograph out of the Republic of Indonesia to Japan by the Study Team.

(6) To secure permission for the use of radio communication facilities if necessary.

V. UNDERTAKINGS OF THE GOVERNMENT OF JAPAN

The Government of Japan through JICA, for the conduct of Master Plan Study and Feasibility Study, will undertake the following :

1. JICA shall, at its own expense, dispatch Japanese Consultants as the Study Team in accordance with the schedule mutually agreed upon by both DGWRD and JICA.
2. JICA shall, at its own expense, receive Indonesian Government personnel connected to the Study for technical training in Japan in accordance with the normal procedures under the Colombo Plan Technical Cooperation Schemes.

VI. STUDY SCHEDULE

The Study, in principle, will be carried out in accordance with the attached table.



REPUBLIC INDONESIA
 DEPARTEMEN PEKERJAAN UMUM
DIREKTORAT JENDERAL PENGAIRAN
 PROYEK PERANCANG PENGEMBANGAN SUMBER-SUMBER AIR (P3.S.A.)
 SUB P3 S A CISADANE JAKARTA CIBEET BANTEN
 Jl. Pattimura No.20 Tilp. 712013 Kebayoran Baru
 Jakarta Selatan

To.
 MR. INAMORI
 Team Leader for K.C.C. Irrigation
 Feasibility Study Project

Jakarta December 8, 1982 .

Our ref : HL 01 01

Dear Sir,

Subject : Kopo - Cikande - Careng Feasibility Study Project .

After discussion meetings in Tokyo and Jakarta regarding the subject mentioned above, may I draw your attention to the following conclusions :

1. The feasibility study has to illaborate the K-C-C irrigation development by-
 using water only from Cibeureum river .
2. Such Irrigation development is accepted by our side within the following -
 framework of understanding .
 - 2.1. The result of feasibility study will be considered as a first stage of-
 the whole irrigation developemnt in K-C-C area and ,
 - 2.2. Will fit the Master Plan of North Banten .

Your kind attention to the above will be higly appreciated .

Thank you .

Yours sincerely ,

Ir. Mashudi

Ir. Mashudi Dipl.HE

Chief of Sub Directorate River
 Basin Planning .

c.c. :

- Mr. Sarbini Bonodibroto .
- JICA Representative , Jakarta
- Mr. B. Yusuf Kardi
- File .



JICA