Annex 2 Production Expenses of Farm Crops

(1) Inputs Requirement for Irrigation Paddy per Ha (Without Project)

Item	Amount (Rp)
Expenses	
Seed (30 kg, 88 Rp/kg)	2,640
Fertilizer	
Urea (200 kg, 42 Rp/kg)	8,400
TSP (70 kg, 40 Rp/kg)	2,800
Insecticide	
Diazinon (2 ℓ, 900 Rp/ℓ)	1,800
Labor Cost	
Seeding & Cutting Grass	
(35 men, 200 Rp/man day)	7,000
Land Preparation	
(26 units, 500 Rp/unit)	13,000
(48 men, 200 Rp/man day)	9,600
Planting (75 men, 150 Rp/man day)	11,250
Weeding, Fertilizing & Spraying Chemicals	
(84 men, 150 Rp/man day)	12,600
Harvesting	
(8 % of the harvest crop)	18,880
Miscellaneous Expenses	8,800
Total Expenses	96,770

(2) Inputs Requirement for Rainfed Paddy in Wet Season per Ha (Without Project)

Item	Amount (Rp)
Expenses	
Seed (35 kg, 88 Rp/kg)	3,080
Fertilizer	
Urea (130 kg, 42 Rp/kg)	5,460
TSP (50 kg, 40 Rp/kg)	2,000
Insecticide (1 ℓ, 900 Rp/ℓ)	900
Labor Cost	
Seeding & Cutting Grass	
(21 men, 200 Rp/man day)	4,200
Land Preparation	
(20 units, 500 Rp/unit)	10,000
(38 men, 200 Rp/man day)	7,600
Planting (75 men, 150 Rp/man day)	11,250
Weeding, Fertilizing & Spraying Chemicals	
(60 men, 150 Rp/man day)	9,000
Harvesting	
(8 % of the harvest crop)	13,210
Miscellaneous Expenses	6,670
Total Expenses	73,370

(3) Inputs Requirement for Rainfed Paddy in Dry Season per Ha (Without Project)

Item	Amount (Rp)
Expenses	
Seed (35 kg, 88 Rp/kg)	3,080
Fertilizer	
Urea (120 kg, 42 Rp/kg)	5,040
TSP (45 kg, 40 Rp/kg)	1,800
Insecticide	
Diazinon (1 ℓ, 900 Rp/ℓ)	900
Labor Cost	
Seeding & Cutting Grass	
(21 men, 200 Rp/man day)	4,200
Land Preparation	
(20 units, 500 Rp/unit)	10,000
(38 men, 200 Rp/man day)	7,600
Planting (75 men, 150 Rp/man day)	11,250
Weeding, Fertilizing & Spraying Chemicals	
(50 men, 150 Rp/man day)	7,500
Harvesting	
(8 % of the harvest crop)	10,380
Miscellaneous Expenses	6,180
Total Expenses	67,930

(4) Inputs Requirement for Wet Season Paddy in Inundated Area (Without Project)

Item	Amount (Rp)
Expenses	
Seed (35 kg, 88 Rp/kg)	3,080
Fertilizer	
Urea (120 kg, 42 Rp/kg)	5,040
TSP (45 kg, 40 Rp/kg)	1,800
Insecticide	
Diazinon (1 ℓ, 900 Rp/ℓ)	1,350
Labor Cost	
Seeding & Cutting Grass	
(21 men, 200 Rp/man day)	4,200
Land Preparation	
(20 units, 500 Rp/unit)	10,000
(38 men, 200 Rp/man day)	7,600
Planting (75 men, 150 Rp/man day)	11,250
Weeding, Fertilizing & Spraying Chemicals	
(60 men, 150 Rp/man day)	9,000
Harvesting	
(8 % of the harvest crop)	9,440
Miscellaneous Expenses	6,280
Total Expenses	69,040

(5) Inputs Requirement for Sugar Cane per Ha (Without Project)

Item	Amount (Rp)
Expenses	
Seed (22,500 stalks, 1.9 Rp/stalk)	42,750
Fertilizer	
Z.A (400 kg, 40 Rp/kg)	16,000
TSP (150 kg, 40 Rp/kg)	6,000
Labor Cost	
Land Preparation	
(110 men, 300 Rp/man day)	33,000
Planting & Fertilizing	
(42 men, 200 Rp/man day)	8,400
Weeding & Ridging	
(182 men, 200 Rp/man day)	36,400
Cutting and Transportation	
(220 men, 200 Rp/man day)	44,000
Miscellaneous Expenses	18,650
Total Expenses	205,200

(6) Inputs Requirement for Soybean per Ha (Without Project)

Item	Amount (Rp)
Expenses	
Seed (35 kg, 104 Rp/kg)	3,640
Labor Cost	
Land Preparation (27 men, 200 Rp/man day)	5,400
Planting (12 men, 150 Rp/man day)	1,800
Weeding (18 men, 150 Rp/man day)	2,700
Harvesting (7 men, 150 Rp/man day)	1,050
Miscellaneous Expenses	1,460
Total Expenses	16,050

(7) Inputs Requirement for Peanut per Ha (Without Project)

Item	Amount (Rp)
Expenses	
Seed (100 kg, 142 Rp/kg)	14,200
Labor Cost	
Land Preparation (27 men, 200 Rp/man day)	5,400
Planting (12 men, 150 Rp/man day)	1,800
Weeding (21 men, 150 Rp/man day)	3,150
Harvesting (15 men, 150 Rp/man day)	2,250
Miscellaneous Expenses	2,680
Total Expenses	29,480

(8) Inputs Requirement for Maize per Ha (Without Project)

Item	Amount (Rp)
Expenses	
Seed (25 kg, 42 Rp/kg)	1,050
Fertilizer	
Urea (50 kg, 42 Rp/kg)	2,100
Labor Cost	
Land Preparation	
(15 men, 200 Rp/man day)	3,000
Planting (5 men, 200 Rp/man day)	750
Weeding (15 men, 150 Rp/man day)	2,250
Harvesting	
(10 men, 150 Rp/man day)	1,500
Miscellaneous Expenses	1,060
Total Expenses	11,710

(9) Inputs Requirement for Cassava per Ha (Without Project)

Item	Amount (Rp)
Expenses	
Seed (11,000 stalks, 0.25 Rp/stalk)	2,750
Labor Cost	
Land Preparation (40 men, 200 Rp/man day)	8,000
Planting (5 men, 150 Rp/man day)	750
Weeding (20 men, 150 Rp/man day)	3,000
Harvesting (20 men, 150 Rp/man day)	3,000
Miscellaneous Expenses	1,750
Total Expenses	19,250

(10) Inputs Requirement for Paddy per Ha (With Project)

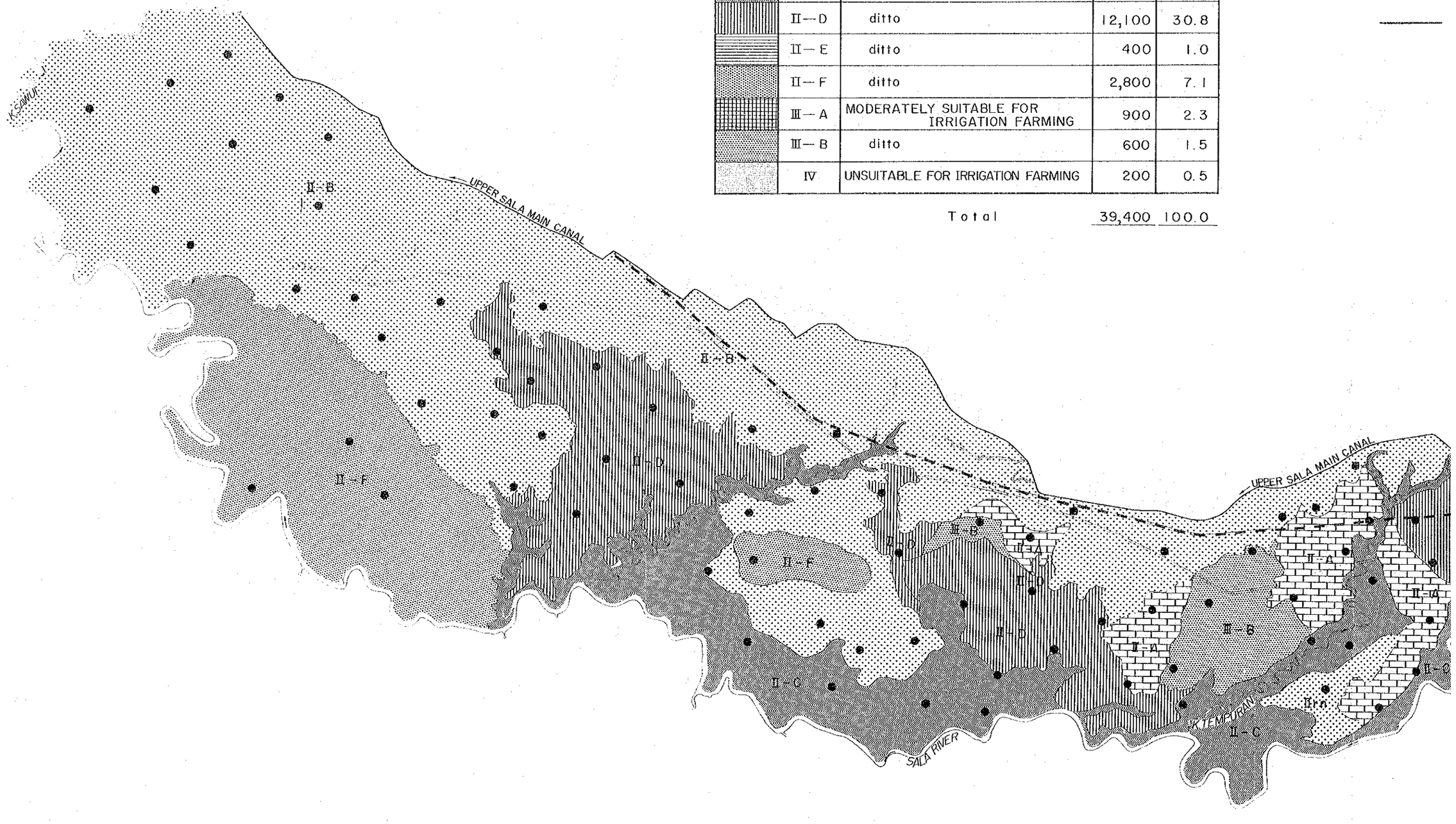
Item	Amount (Rp)
Expenses	
Seed (25 kg, 88 Rp/kg)	2,200
Fertilizer	
Urea (250 kg, 42 Rp/kg)	10,500
TSP (100 kg, 40 Rp/kg)	4,000
Insecticide	
Diazinon (4 ℓ, 900 Rp/ℓ)	3,600
Rodenticide	
Zinkphosphide (0.2 Kg, 2,300 Rp/kg)	460
Labor Cost	
Seeding & Cutting Grass	
(35 men, 200 Rp/man day)	7,000
Land Preparation	
(26 units, 500 Rp/unit)	13,000
(52 men, 200 Rp/man day)	10,400
Planting (75 men, 150 Rp/man day)	11,250
Weeding, Fertilizing & Spraying Chemicals	
(92 men, 150 Rp/man day)	13,800
Harvesting	
(8 % of the harvest crop)	25,960
Miscellaneous Expenses	12,530
Total Expenses	114,700

(11) Inputs Requirement for Sugar Cane per Ha (With Project)

Item	Amount (Rp)
Expenses	
Seed (22,500 stalks, 1.9 Rp/stalk)	42,750
Fertilizer	
Z.A (600 kg, 40 Rp/kg)	24,000
TSP (200 kg, 40 Rp/kg)	8,000
Insecticide (4 ℓ, 900 Rp/ℓ)	3,600
Fungicide (2 ℓ, 900 Rp/ℓ)	1,800
Labor Cost	
Land Preparation (110 men, 300 Rp/man day)	33,000
Planting & Fertilizing (50 men, 200 Rp/man day)	10,000
Weeding & Ridging (200 men, 200 Rp/man day)	40,000
Cutting and Transporation (240 men, 200 Rp/man day)	48,000
Miscellaneous Expenses	21,120
Total Expenses	232,270

LEGEND

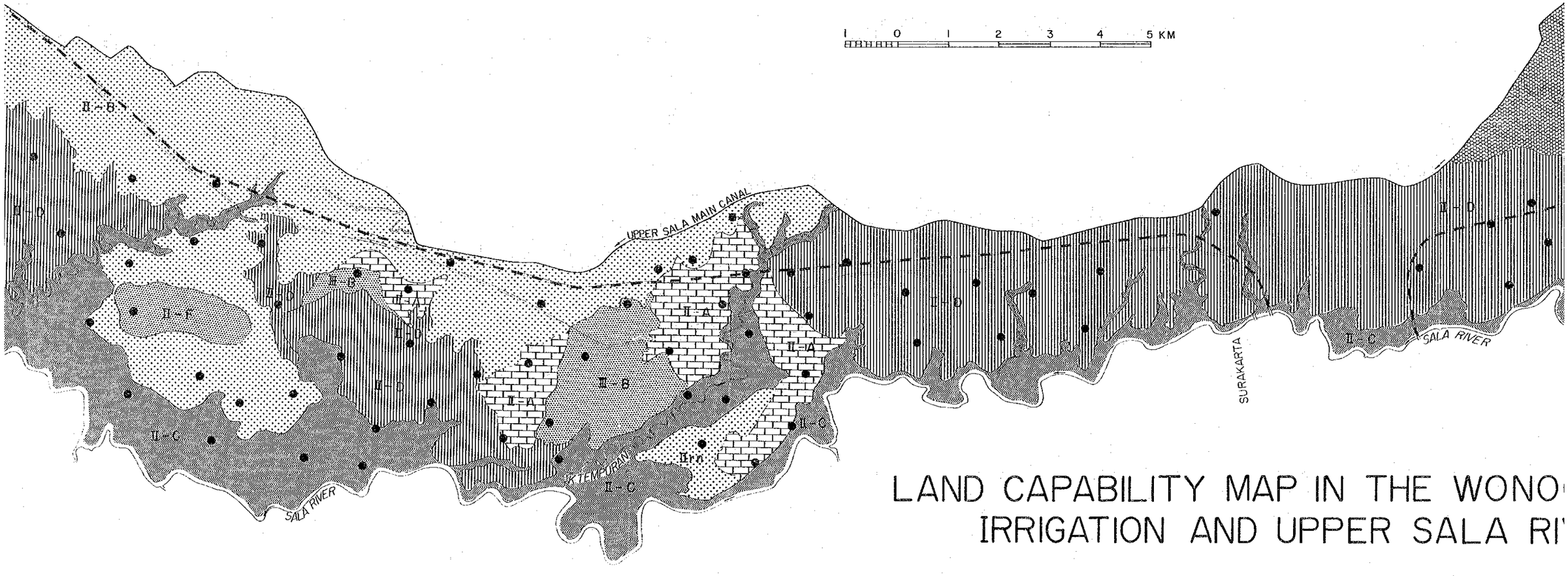
Mapping Unit	Grade		Surveyed Area ha	Surveyed Area %
	I	VERY SUITABLE FOR IRRIGATION FARMING	2,600	6.6
	II — A	SUITABLE FOR IRRIGATION FARMING	1,000	2.5
	II — B	ditto	11,100	28.5
	II — C	ditto	7,700	19.5
	II — D	ditto	12,100	30.8
	II — E	ditto	400	1.0
	II — F	ditto	2,800	7.1
	III — A	MODERATELY SUITABLE FOR IRRIGATION FARMING	900	2.3
	III — B	ditto	600	1.5
	IV	UNSUITABLE FOR IRRIGATION FARMING	200	0.5
		Total	39,400	100.0



LEGEND

Mapping Unit	Grade		Surveyed Area ha	Surveyed Area %
	I	VERY SUITABLE FOR IRRIGATION FARMING	2,600	6.6
	II — A	SUITABLE FOR IRRIGATION FARMING	1,000	2.5
	II — B	ditto	11,100	28.5
	II — C	ditto	7,700	19.5
	II — D	ditto	12,100	30.8
	II — E	ditto	400	1.0
	II — F	ditto	2,800	7.1
	III — A	MODERATELY SUITABLE FOR IRRIGATION FARMING	900	2.3
	III — B	ditto	600	1.5
	IV	UNSUITABLE FOR IRRIGATION FARMING	200	0.5
		Total	39,400	100.0

- Location of soil pit
- High way
- Railway
- Main irrigation canal



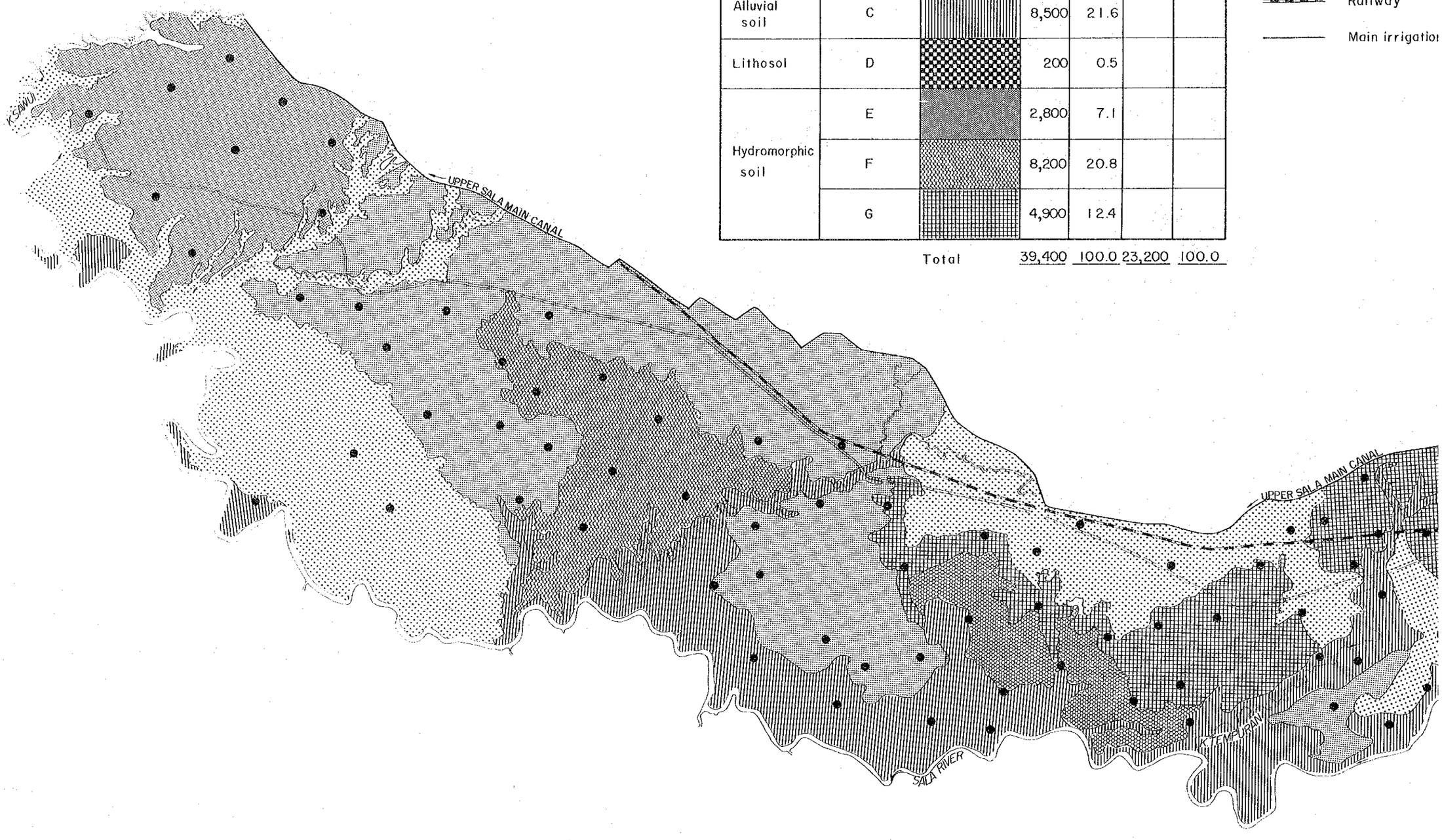
LAND CAPABILITY MAP IN THE WONO
IRRIGATION AND UPPER SALA RI

CAPABILITY MAP IN THE WONOGIRI IRRIGATION AND UPPER SALA RIVER IMPROVEMENT PROJECT

LEGEND

Great soil group	Soil series	Mapping unit	Surveyed area (ha)	Surveyed area (%)	Project area (ha)	Project area (%)
Grumusol	A		9,600	24.4		
	B		5,200	13.2		
Alluvial soil	C		8,500	21.6		
Lithosol	D		200	0.5		
Hydromorphic soil	E		2,800	7.1		
	F		8,200	20.8		
	G		4,900	12.4		
		Total	39,400	100.0	23,200	100.0

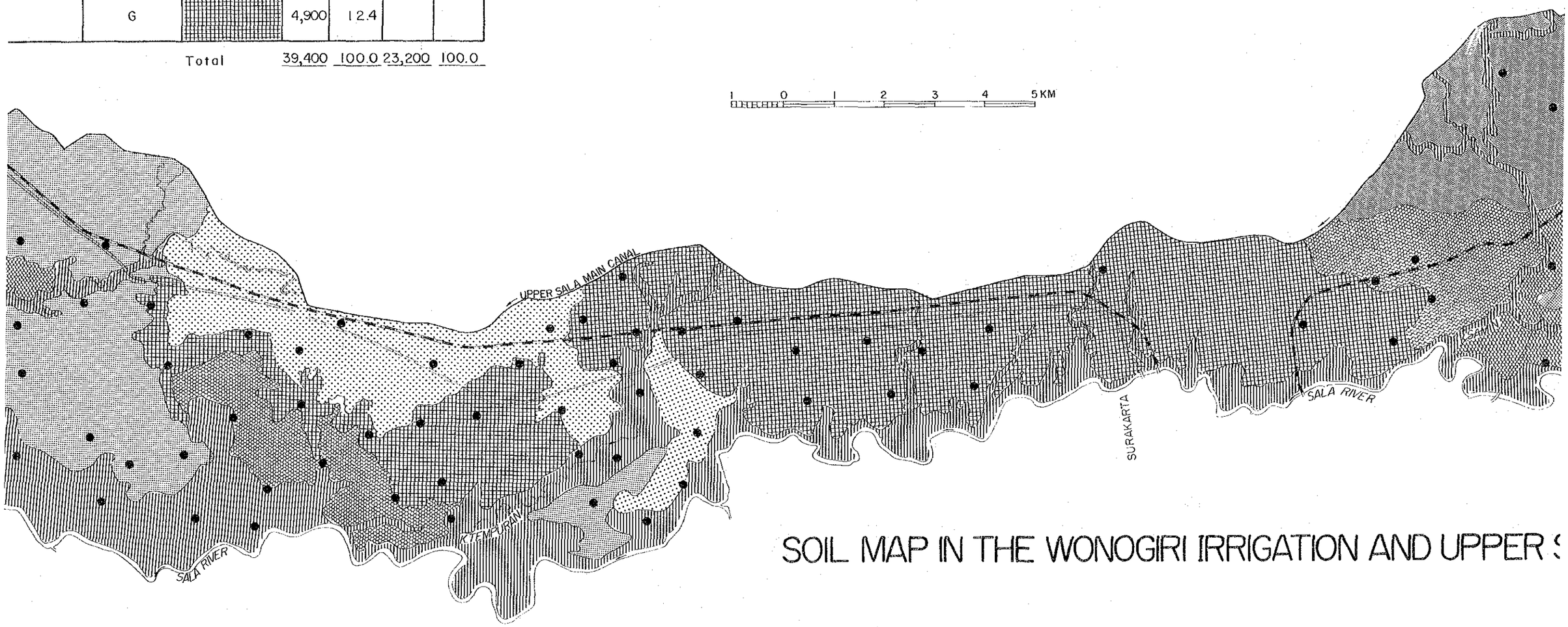
- Location of s
- High way
- Railway
- Main irrigatio



LEGEND

Great soil group	Soil series	Mapping unit	Surveyed area (ha)	Surveyed area (%)	Project area (ha)	Project area (%)
umusol	A		9,600	24.4		
	B		5,200	13.2		
uvial oil	C		8,500	21.6		
hosol	D		200	0.5		
	E		2,800	7.1		
dromorphic oil	F		8,200	20.8		
	G		4,900	12.4		
	Total		39,400	100.0	23,200	100.0

- Location of soil pit
- High way
- Railway
- Main irrigation canal



SOIL MAP IN THE WONOGIRI IRRIGATION AND UPPER S

P IN THE WONOGIRI IRRIGATION AND UPPER SALA RIVER IMPROVEMENT PROJECT

II. INSTITUTIONS

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INSTITUTIONS

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1. GENERAL

Institutional study has been undertaken in four (4) major fields of (1) Water Management, (2) Rural Credit, Input Supply and Marketing, (3) Agricultural Extension Services, and (4) Rural Development Mechanism as a whole.

1.1 WATER MANAGEMENT

(a) Operation and maintenance system, personnel and job-description of the existing irrigation facilities by DPUT (Ministry of Public Work and Power).

Reference is to be made to Table II-1: Operation-Maintenance Organization of the Existing Irrigation Facilities (as of March 1976), as well as Fig. II-3: P.U. Seksi Pengairan. Proposals for O&M system for the projected irrigation facilities are made under 8.2: Organization for Operation and Maintenance, in the Main Report.

(b) Water Management and O&M institution operated by the cultivating farmers

Reference is to be made to (1) Puro Dharmatirta, attached hereto and to 8.3.2: Water User's Association in the Main Report.

1.2 RURAL CREDIT, INPUT SUPPLY AND MARKETING

Reference is to be made to Table II-3: Unit Desas & Their Facilities and Table II-2: Bimas (Baru & Biasa combined) Credit & Its Recovery Rates for 1974-75, which serve as indicators of the current situations and, for the future development, see (2) Unit Desa System and the Wonogiri Irrigation Project and (3) Institutional Rehabilitation Under the Project, attached hereto.

1.3 AGRICULTURAL EXTENSION SERVICE

Reference is to be made to Table II-3: Unit Desas & Their Facilities (especially, columns 9 and 10) and Fig. II-2: Extension Service, to grasp their existing conditions, and see 8.3.4: Research, Extension and Pilot Scheme, in the Main Report, for its future development.

1.4 RURAL DEVELOPMENT MECHANISM

Reference is to be made to Fig. II-1: Rural Socio-Economic Development Mechanism and Fig. II-2 through Fig. II-6, illustrating the organizational setup of each agency involved. Because of its high potential as an institution help developing socio-economic as well as cultural level of rural population, a paper has been specially prepared as (3) Lembaga Social Desa.

In addition to the above, case-study at Nambangan village is attached hereto as (4) Short-cutting of the Bengawan Sala and the Possible Impacts on the Communal Life of the Villagers, to assess the possible impacts of short-cutting works under the Flood Control project.

2. UNIT DESA SYSTEM AND THE WONOGIRI IRRIGATION PROJECT

Unit Desa System is based on the line-up of three organs of the BRI branch, one PPL and Koperasi Unit Desa (KUD) equippe with Kiosk, Godown and Rice-Mill, with the primary intention of successfully implementing BIMAS program toward 600 - 1,000 hs of paddy field extending over 6 desas (on an average in the project-area).

2.1 BRI - SUPPLIER OF CREDIT

The performance of BIMAS/INMAS program has been analyzed from the view point of the recovery rate (Bimas - Baru & Biasa combined - Credit & Its Recovery Rates for 1974-75, see Table II-2). Nobody will be satisfied with this low rate of recovery which averages around 50% as a whole. Such is the recovery rate of BIMAS/INMAS credit in the kabupatens and kecamatans which are coming either wholly or partially under the project where two paddy crops a year are being raised in the limited area today. Under the project, $2\frac{1}{2}$ paddy crops a year are proposed which is impossible without the corresponding increases in input supplie such as seeds, fertilizers, and chemicals. How much increases are estimated under the project? The answer may be given from the following tables:

Table II-4 Present Land Use (ha)

	Sragen	Karanganyar	Dengkeng	Total
Paddyfield /(a)				23,200
(Irrigated) /(b)	(7,000)	(7,740)	(1,100)	(15,840)
(Non-irrigated)	(2,500)	(2,360)	(2,500)	(7,360)
Wet season paddy	7,290	8,210	3,030	18,530
Dry " "	1,970	3,390	560	5,920

Land Use Ratio:

Wet season (a)	7,000(100%)	7,740(100%)	1,100(100%)	15,840(100%)
" (b)	290(12%)	470(20%)	1,930(77%)	2,690(37%)
Dry season (a)	1,970(28%)	2,360(100%)	560(22%)	5,920(80%)
" (b)	-	1,030(30%)	-	-

(a) = Technical and semi-technical irrigated areas;

(b) = Non-irrigated and rainfed areas.

Table II-5 Input Requirements for Paddy Cultivation (per ha)

	Without Project				With Project
	Rainy Season		Dry Season		All Through the Year
	Irrigated Area	Rainfed Area	Irrigated Area	Rainfed Area	Irrigated Area
Seeds	30 kg	35 kg	30 kg	35 kg	25 kg
Fertilizer					
Urea	200 "	130 "	200 "	120 "	250 "
TSP	70 "	50 "	70 "	40 "	100 "
Insecticide	2 l	1 l	2 l	1 l	4 l
Rodenticide	-	-	-	-	0.2 kg

Input Requiremtns: At Present & Future with Project

Input Materials	Kind of Area	Rainy Season (At Present) Area	per ha.	Total	Dry Season (At Present) Area	per ha.	Total
Seed	Irrigated	15,840 ha	30 kg	475.2 tons	5,920 ha	30 kg	177.6 tons
Urea	Areas		200 "	3,096.6 "		200 "	1,184.0 "
TSP			70 "	1,108.8 "		70 "	414.4 "
Diazinon			2 l	31,680 l		2 l	11,840 l
Seed	Non-irriga-	2,690 ha	35 kg	94.15 tons			
Urea	ted Areas		130 "	349.7 "			
TSP			50 "	134.5 "			
Diazinon			1 l	2,690 "			

Requirements at Present:

	Rainy Season	Dry Season	All-Year Total
Seed	569.35 tons	177.6 tons	746.95 tons
Urea	3,446.3 "	1,184.0 "	4,630.3 "
TSP	1,243.3 "	414.4 "	1,657.7 "
Dizin.	34,370 l	11,840 l	46,210 l

Irrigable All Through the Year (2.5 paddy crops/year) Future with Project

Input Materials	Area	per ha.	Total Requirements		Requirements at Present	Additional Requirements
Seed	19,840 ha	25 kg	496.0 tons x $2\frac{1}{2}$ =	1,240 tons	746.95 tons	493.05 tons
Urea		250 "	4,960.0 " x $2\frac{1}{2}$ =	12,400.0 tons	4,630.3 "	7,769.7 "
TSP		100 "	1,984.0 " x $2\frac{1}{2}$ =	4,960.0 "	1,657.5 "	3,302.3 "
Diazinon		4 l	79,360 l x $2\frac{1}{2}$ =	198,400 l	46,210 l	152,190 l
Rodenticide		0.2 kg	3.968 tons x $2\frac{1}{2}$ =	9.92 tons	-	9.92 tons

The above tables are based on assumptions; still when the Project is implemented, the yearly requirements for the input materials in the project area would be more than the current requirements by 66% with seeds, 168% with urea, almost 200% with TSP, and nearly 330% with insecticide, plus 10 tons of rodenticide: Under the perennial irrigation conditions, farmers will be preparing nursery bed while his neighbor farmer is harvesting: paddy cultivation is simply a continuous process without any punctuation between rainy season and dry season. This much increment for a year and, moreover, all these input materials must be made readily available to the cultivating farmers all through the year, not at two times a year, viz: at the beginnings of rainy season and dry season. Is it feasible that the entire paddyfield in the project area can be covered by BIMAS credit at the current rates as against the Project's recommendations?

Inputs	Bimas Credit (Baru)	Bimas Credit (Biasa)	Project's Recommendations
Seeds	25 kg	-	25 kg
Urea	300 "	150 kg	250 "
TSP	75 "	75 "	100 "
Insecticide	3 l	3 l	4 l
Rodenticide	0.2 kg	0.2 kg	0.2 kg

Project implementation in its agricultural sector should aim at 100% recovery of Bimas/Inmas credits with those farmers who can take advantage of them; for those who may not be able to get Bimas/Inmas credits, capital must be accumulated for reinvestment in paddy production in terms of voluntary savings with an appropriate institution when marketing their paddy (when $2\frac{1}{2}$ paddy crops a year will be realized, the average net reserve or capacity to pay will become Rp. 111,720 with a typical farmer with paddyfield of 0.52 ha, while it will be Rp. 3,009 and Rp. 249 in future without project with the same scale of management, the former in the irrigated area and the latter in the rainfed area /1. This much income increase will allow farmers to save a considerable portion of it and thereby carry on paddy cultivation without relying upon Bimas/Inmas credits). The question is whether the BRI branch lined up with Unit Desa system can really handle such savings or if farmers will feel inclined to save with it.

/1 see Project Economy, Appendix III.

2.2 PPL - EXTENSION & TECHNICAL GUIDANCE

Although its network is considerably tight and efficient in this area, the numerical shortage of PPLs cannot escape an objective observation; it would be too harsh to ask each PPL to pay attention on "supervised credit", that is, an intensive guidance particularly toward Bimas farmers to enable them to raise their agricultural productivity high enough to allow full repayment of Bimas credit. The intensity of agricultural extension service is shown in Table II-3 Unit Desas & Their Facilities. To facilitate improvement of agricultural extension services, the Pilot Scheme is being proposed under the Project (Refer to Main Report). The point to be raised is that PPL at the present has no intimate relationship with BRI nor KUD; today PPL is unfortunately not functioning nor numerically enough to function as an instrument to link-up credit (input supply) and marketing.

2.3 KUD - INPUT SUPPLIER & MARKETING AGENCY

Although it was designed that KUD would eventually function as a kind of multi-purpose agricultural co-operative society, KUD in this area is still maintaining the physique as BUUD even after its wholesale promotion or upgrading to KUD during 1975. KUD's facilities and its activities in input supply distribution have been tabulated in Table II-3 Unit Desas & Their Facilities. It has been pointed out that "KUD's role in input supply distribution is far from perfect as will be known from the fact that almost all the Kiosks with the Unit Desa are 'temporary' ones." It has also been pointed out that KUD today is very weak in marketing paddy to the Sub-Dolog. This is partly due to the cumbersome rules and regulations in the Sub-Dolog's procurement of paddy or rice which KUD cannot afford to comply with. Such failure of KUD in the marketing aspect has been attributed to the fact that "farmers under Bimas program almost always pay back their loan direct to BRI branch in cash, not in terms of paddy delivered to KUD. Consequently, KUD is almost wholly out of place in marketing its member-farmers' product for whose realization the input requirements supplied by KUD have played a vital role. This is the reason why KUD does not have adequate facilities like godowns and rice-mills as specified by the Presidential Decree in 1973 on Unit Desa or, in other words, KUD cannot afford to maintain godowns and rice-mills because it fails to collect enough amount of paddy."

The root-cause of the inefficiency of KUD is explained as follows: "the root-cause of KUD's failure or betrayal to the aim of the Unit Desa system seems to lie at the philosophy behind the very concept of BUUD/KUD is a purely economic organization akin to a commercial house or business agent (gesellschaft), and its essential characteristic as a socio-cultural and community-based body (gemeinschaft) was almost completely forgotten. In Indonesia,

as elsewhere, the natural service-zone of a primary agricultural co-operative society should have been confined within the sphere which is made unanimous and homogenous by virture of the villagers' selamatan, where gotong-rojong works without any hitch, where musjawarah results at mupakat, and where jimpitan plays a primitive but most natural role of income equalizer. Economic circulatory mechanism based on co-operative principles can fully operated under these circumstances only. The boundary of a primary co-operative which is doomed to be multi-purpose for self-evident reasons, should not be extended over one village, as long as transport and communication remains at the present less-developed level."

It should be emphasized that, out of so many problems, three important points pertaining to "village formation based on identity", "gotong-rojong as community spirit", and "villagers' relations with the supra-village world" which are the deciding factors whether a supra-village primary MPCS can be organized in the form of KUD or a primary MPCS is to be organized on the village-level with supra-village support as required./1

(a) "Village Formation Based on Identity"

The principles of relationship that underlie the social system known as "desa" may be roughly categorized into four, viz (i) ties of kinship (genealogical), (ii) ties of proximity of residence (territorial), (iii) ties of common objectives, and (iv) ties of relationship superimposed from above by a supreme government. The interrelation of these principles underlying the village formation conform to two kinds of patterns: (i) concentric pattern, and (ii) diverging pattern.

(i) Concentric pattern is made up of the circles of relationship which are mutually inclusive and concentrically interrelated; members of the smaller, inner circles are also members of the larger, outer ones. The inner circle is composed of nearest kinsmen and neighbors with whom people associate on the basis of genealogical and territorial ties and it pertains to daily matters around the household. The larger, outer circle has, beyond the daily matters mainly concerned by the inner smaller circle, the common objectives either concerning agricultural or other productive occupations and related socio-cultural activities, often recognized by the members as a distinct territorial part of the whole with its own identity and with a specific term or name. Still wider concentric circles exist, within which people associate with others concerning different aspects of village life. At a certain point a general conception of the largest circle is reached; this is

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/1 Owes enormously to Prof. Koentjaraningat of the University of Indonesia for the information the latter provided him in drafting this part of the Notes.

the limit of the village community, and all relations with people outside this circle are felt to be relations with outsiders.

(ii) Diverging pattern - various smaller or larger circles of relations are not mutually inclusive but yet are interrelated at several points; members of one circle are not necessarily members of others; the various circles related to different aspects of village life and may even be based on different principles of relationship. For matters pertaining to the household, people associate within a particular group of close relatives and neighbors - for cooperation in the agricultural field, people associate within another circle, which does not necessarily include all the members of the first circle; still other circles of relationship may exist for different aspects of like, based on different principles. The various mutually independent social circles are usually integrated by a higher identity (in urban communities, where the diverging pattern of social relations usually exists, the integrating force is the higher national identity, while in the rural area the integrating mechanism is rather religious or social).

The most important element to determine the limits of the village community is sense of identity which is stimulated by some integrating force. It is very important to direct our attention to the fact that the size of village communities in general remains within certain limits. Cities that have started to grow will keep growing endlessly, while villages tend to grow only up to a certain point and then always branch to form daughter villages or fall apart into several smaller villages. This universal phenomenon seems to indicate the occurrence of a specific type of relationship within all village communities, namely, that type of relationship that prevails in primary groups and is characterized by spontaneity and great solidarity. This type of relationship forces the community to remain small.

(b) "Gotong-rojong as Community Spirit"

We may be able to classify "gotong-rojong" into three categories: (i) wederkerig hulpbetoon - mutual aid, which works effectively in small projects requiring work groups not exceeding a maximum of 10-15 people, which demand a minimum of specialized skills. Such gotong-rojong needs a lot of leadership; (ii) ondering hulpbetoon - rendering aid for the common benefit, closely related to the type of relationship that prevails in primary groups, which are characterized by recurrent face-to-face association and undifferentiated cooperation, and (iii) gotong-rojong as a community spirit - a sociocultural ethos that underlies the value system, mores, and folkways of a society. Sacrifice for

the common benefit seems to be valued highly, individualism regarded with disapproval, the rights of the individual are not greatly emphasized, and the spirit of cooperation forms the basis of social interaction. In Indonesia, this kind of co-operative ethos prevails in most of the village communities, and it is this aspect of gotong-rojong, rather than the two others, that has been adopted by the Indonesian nation as the most important principle that underlies its national community. Yet it seems that this kind of gotong-rojong seldom works beyond the desa-boundary.

(c) "Villagers' Relations with the Supravillage World"

"Most of the Indonesian villages are inhabited by rural people in old civilizations, ... who control and cultivate their land for subsistence and as a part of a traditional way of life and who look to and are influenced by gentry or townspeople whose way of life is like theirs but in a more civilized form" (Redfield 1956,20). Although most villagers in Indonesia are aware of the existence of a higher tradition, of higher levels of authority, and of a higher national government, this does not necessarily mean that they also have an extensive perception, knowledge, and understanding of the world beyond the village. A majority of Indonesian peasants probably find most of their social relations in the agricultural field. This circle of relations includes their closest relatives, neighbors of the same hamlets, acquaintances from other hamlets who have agricultural land adjacent to their own, residents of other hamlets who share membership in the same irrigation organization, landlords whose land they work on a sharecropping basis or whose land they rent, and agricultural laborers from distant villages who come to work for wages during particular times of the year. Some of these peasants, although not all of them, are oriented toward trade. In addition to their kinsmen, neighbors, friends, and acquaintances within the village, these peasants include within their circle of relations buyers and sellers from other villages, wholesalers from the towns, and many other people who come to the markets on recurrent market days. Yet, "the village or desa is a distinct and long standing unit of corporate organization in Javanese rural society. In its membership and action it is highly discrete. Its edges are marked socially by the high degree of solidarity fellow villagers show toward one another in daily intercourse and on occasions of threats to the village community. Aggression against a fellow villager is penalized more heavily than any wrong done an outsider. Congruently, a villager beyond his immediate community is most often identified by his village affiliation rather than by any other kind of connection." ("Javanese Villagers - Social Relations in Rural Modjokuto, Robert R. Jay)

Much has been said about the particular identity felt by the villagers and that the gotong-rojong spirit prevailing in the village seldom spreads to the supravillage world and that any worthy project can be achieved only within the boundary of the same village; such village-centered psychology and mentality is reinforced by less

convenient transportation and communication facilities which help keep techno-economic transfer among the villages dull. The institutional expert has no intention of saying that such a situation will last semi-permanently. The implementation of the Wonogiri Project will bring a radical change to such a situation but it will definitely take time. This is the reason why KUD without an efficient branch in desa cannot function well. It has been pointed out earlier under BRI that all through the year enormously increased amounts of input supplies which can be satisfactorily obtained only from the unit existing in the same village, not from KUD which serves for 5-6 villages at the same time needs to be made available to the villagers.

3. INSTITUTIONAL REHABILITATION UNDER THE PROJECT

3.1 BIMAS/INMAS (YANG DISEMPURNAKAN)

The findings of the study which focused on the recovery rates for the 1974/75 wet season and the 1975 dry season have been tabulated as Bimas (Baru & Biasa combined) Credit & Its Recovery Rates for 1974/75. The recovery rate varies from Kabupaten to Kabupaten and also between wet season and dry season, but the general performance is far from satisfactory. And it is very much feared that if action to definitely improve the recovery rates is not taken almost immediately, the continuation of Bimas/Inmas system itself may be doomed for suspension. It needs to be kept in mind that the rural credit can and must serve, so to speak, as a bucketful or two of water for priming a pump, that is, to help exploit agricultural development potential which has so far been kept underdeveloped, and never given a full dose to meet its input requirements for simple reproduction and subsistence costs to the cultivating farmers.

In improving the recovery rate, serious efforts must be concentrated on how to raise the productivity so that the borrowing farmers will not only pay back their loans without any difficulty but will also save a considerable part of their receipts from agricultural production as a fund for enlarged reproduction and better living in the future. Through the recent analytical study by the Feasibility Study Team, though during a very limited time, were brought some tangible results. The recovery rate of Bimas/Inmas which has been rather unsatisfactory and, in fact, worsening for the last couple of years, will be improved by adopting a "supervised credit system" through the coordinated efforts of the supplier of the credit, the extension worker, and the supplier of input requirements and the marketing agency of the agricultural products.

3.2 UNIT DESA SYSTEM

The Unit Desa system which has been functioning as an accelerator of food production increase by combining one BRI branch, one PPL, and KUD with Kiosk, Godown and Rice-mill for each 600-1,000 ha paddy field which is shared on an average basis by six (6) desas in the project area, however, has many shortcomings because the above-said "supervised credit system" has not been put into practice among its constituent agencies or rather because its constituent agencies are mechanically combined but not organically combined to make such a combination conductive for adoption of the "supervised credit system" possible.

At present, BRI branch offers Bimas/Inmas credit to the qualified farmers in the form of certificates valid for procurement of the input materials but there is no guarantee against the loanees misusing them, for instance, it is possible to sell a part of the input materials after delivery; as Bimas/Inmas credit is made repayable in cash, the loanees can make themselves creditworthy for the next season, even when the current crop may fail to bring enough proceeds, by borrowing money from elsewhere. In short, there exists no element compulsory for production-increase in Bimas/Inmas credit.

Again, there exists no criteria for evaluating the extension services given by a PPL. Under the "supervised credit system", the PPL's extension service can be assessed by the recovery rate of Bimas/Inmas credit.

KUD, on the other hand, by reason of its supra-village composition, has no intimate knowledge of, to say nothing of the control of, the actual manner in which the farmers use the input materials supplied through it nor is it interested in the least about such and simply waits for the farmers to bring paddy to sell to it which happens only when the market price falls low; it has no inclination toward productivity-increase because it is not assured of handling the marketing part of the produce.

In conclusion, it is to be realized that the "supervised credit system" does not function unless credit and marketing are linked together by the medium of technical guidance or extension services ('credit' stands, in this case, for 'making the cultivating farmers accessible to the proper set of input materials'.)

3.3 VILLAGE MPCS AND THEIR KABUPATEN FEDERATION THROUGH KUD

Hereupon, the recommendations for encouraging the organization of the multi-purpose agricultural co-operative society on desa basis as a branch-office of KUD and their affiliation with Kabupaten Federation through KUD come to assume special significance. Such village MPCS shall link the credit (primarily in kind), the technical guidance in production (by hiring the services of PPL), and the procurement of agricultural products partly for recovery of the loan and partly for savings, their storage and small-scale polishing of rice for family consumption of the member-farmers. Because of a lack of capital resources, newly organized village MPCS cannot start credit service immediately; in this respect village MPCS needs to be assisted by BRI but not in the manner assumed by BRI branch at Unit Desa level today. The village MPCS' credit services shall primarily be in kind which will be procured in bulk by its Kabupaten Federation on credit offerable by BRI, and distributed among the village MPCS affiliated with it. The technical guidance or extension services or, in other words, "supervision" is also possible by hiring PPL who shall give the farmers who have obtained input supplies from village MPCS good advice on how to use them properly

to raise the highest possible yield under the prevailing conditions. From the PPL's information on the growth of paddy in the field, village MPCS will be in a position to assess a rough amount of produce which it can handle at harvest season, and convey such information to their Federation at Kabupaten-level so that the latter may start entering sales contracts with the Sub-Dolog and other big buyers, either in paddy or rice, according to which make necessary preparations for a centralized drying, storage and polishing of the marketable surplus collected from each village MPCS. Both for delivery of input supplies and other daily necessities to its affiliated village MPCS and collection of paddy therefrom, Kabupaten Federation will probably need some vehicles, apart from sizeable godown and rice-mill.

Effective adoption of the "supervised credit system" based on the linkage of credit extension procurement of produce by the village MPCS will not only raise the recovery rate of the credit offerable by it to its member-farmers but also the agricultural productivity of theirs enormously, thus enabling the village MPCS to ship out a considerable amount of marketable surplus of paddy to the Kabupaten Federation through the local KUD. The Kabupaten Federation which is held responsible for procurement of the input materials required by the member-farmers of the village MPCS and their smooth and timely distribution among the village MPCS will, in return, collects the marketable surplus of paddy at its godown, and properly dry and polish according to the advance contracts with the Sub-Dolog and other big buyers. For such an exchange of input materials and marketable paddy between the village MPCS and the Kabupaten Federation, the existing KUD with its kiosk, godown and rice-mill will be extremely useful. If and when such an excellent team work among the Federation, KUD and the village MPCS will start functioning, then, it must be the proper time for the representatives of the Agricultural Cooperative Movement to sit at the BAPEL meetings at village-, kecamatan- and kabupaten-levels, in deciding on production-quota, Bimas/Inmas credit allocation, and other important matters pertaining to food-production-increase campaign.

3.4 SOME TECHNICAL PROBLEMS PERTAINING TO THE INSTITUTIONAL REHABILITATION

3.4.1 Formation of the Village MPCS as a Branch-Office of KUD

The project area has had some number of village agricultural cooperative societies until quite recently and, therefore, organization of village MPCS under the Project will not be very difficult. It is very necessary to get the full understanding of the villagers that the new village MPCS is not the same as the one which was controlled by political adventurism but one that genuinely seeks the socio-economic development of the villagers themselves so that the

village elite will come forward to take over the responsibility of organizing and operating such village MPCS with renewed determination. If this is possible, construction of a simple office, supply point and a small warehouse equipped with a simple polishing machine will follow without much difficulty. It is most desirable that young men who are from the same village and have been educated in the cities will undergo co-operative training and assume the manager's post of the village MPCS.

3.4.2 Establishment of Kabupaten Federation of Agricultural Co-ops.

Village MPCS will need to be affiliated with Kabupaten Federation, through the local KUD, to get assistance in all the areas of its activities such as credit (primarily in kind), input supplies (endorsed by the credit), marketing to the Sub-Dolog and other major buyers after necessary processing, as well as the benefit in terms of education/training of its office-bearers and employees and auditing of its accountbooks and financial documents. Staffing of the Federation is not very easy, indeed. A lot of initial assistance from the Cooperative Office will be indispensable. As for the material aspect, the Federation will need to have adequate godown to store the marketable surplus of paddy from the affiliated village MPCS and the rice-mill to meet the demand of the big buyers. It will also need sizeable storage space to keep the inputs before they are timely distributed among the village MPCSs. For collection of paddy from, and distribution of input supplies to, the village MPCSs, it will need a few motor trucks.

3.4.3 Reallocation of the Personnel

Under the new arrangement, the BRI branch linked together with the Unit Desa system will not require three staff members; one will be enough for general supervision and two may be transferred either to the village MPCSs or their Kabupaten Federations. In any case, they will need some sort of co-operative education and training before reallocation. Each Unit Desa will have three (3) PPLs in the near future, each one of them being given the responsibility to help production-guidance on behalf of two (2) village MPCSs, on an average.

3.5 REHABILITATION OF THE AGRICULTURAL COOPERATIVE SYSTEM ON AN EXPERIMENTAL BASIS THROUGH THE IMPLEMENTATION OF THE PILOT SCHEME

The Pilot Scheme which is proposed for the successful implementation of the Wonogiri Irrigation Project has three (3) phases: (i) Experiment Farm, (ii) Pilot Area Program, and (iii) Pioneer Project. In the Pilot Area Program for a desa and the Pioneer Project for a few Kecamatans, the organization of the cultivating farmers into the MPCS and also into Dharma-Tirta is essential. In the course of implementing the Pilot Scheme, particularly in the phases of the Pilot Area Program and the Pioneer Project, the above said recommendations on rehabilitation of the agricultural cooperative system in the project area will be experimental. Concrete proposals for its execution, including the manner of giving a positive rule to the existing KUD and other constituent organs of the Unit Desa system, will be made upon discussion among the authorities concerned of the Indonesian Government.

3.6 CONCLUSIONS

In consideration of the intensity of paddy cultivation projected for the 23,200 ha which will be made perennially irrigable, and in view of making such supporting services as the rural credit, input supplies, production-guidance, processing, storage and marketing of the product, etc., readily available to the cultivating farmers for $2\frac{1}{2}$ paddy crops a year, and to make it possible for the Sub-Dolog to procure a much larger portion of farmers' marketable surplus of rice, it will be necessary to improve the working method and mechanism among the KUD, BRI, PPL and the Sub-Dolog. As the Unit Desa system, which has been functioning as an important instrument for implementation of Bimas program purported for rice production increase, is authorized by the Presidential decree issued during 1973, it is not desirable to make a drastic departure from the present setup and function. It would be worthwhile, however, to adopt, on an experimental basis and exclusively for the implementation of the Wonogiri Irrigation Project, some reasonable adjustment to the manner of KUD's coordination with BRI, PPL, and Sub-Dolog, in its functional aspect and the program of encouraging rehabilitation of the village MPCS in each desa as the branch-office of KUD and establishing its Federation at Kabupaten level, in its organizational aspect.

4. PURO DHARMA TIRTA

Water management in this area situated in Kabupaten Sragen has undergone a checkered experience: till the end of the 1960s, irrigation was used to be managed on individual basis or in unorganized manner, though under the general guidance of ulu-ulu desa who could get assistance of pembantu ulu-ulu, and water disputes often arose sometimes resulting at bloodshed; paddy cultivation was possible only once a year. The local farmers did realize the necessity to organize themselves for better irrigation and decided to form P.A.S. (Peraturan Air Surakarta) in their meeting in June 1969. A pilot project was started in Block I where water distribution was made by use of water measuring devices (Thompson/Meetschot) and thus fighting on water distribution stopped and it became possible to raise 2 crops a year mainly through irrigation improvement. According to the Central Java Governor's decree dated March 1, 1970, the farmers decided in their PAS meeting in April 1970 to convert their water management organization to Dharma Tirta and simultaneously to develop Block II and Block III as an extension of the project which had been started in Block I. Both Block II and Block III were completed in November 1970. Full-fledged Dharma Tirta activities, therefore, were initiated in this area since the end of 1970.

Puro Dharma Tirta has a total command area of 386 ha., and the membership of 1,102 from 3 desas of Karas, Bolorejo and Puro; its blockwise distribution of paddyfield and membership is as follows:

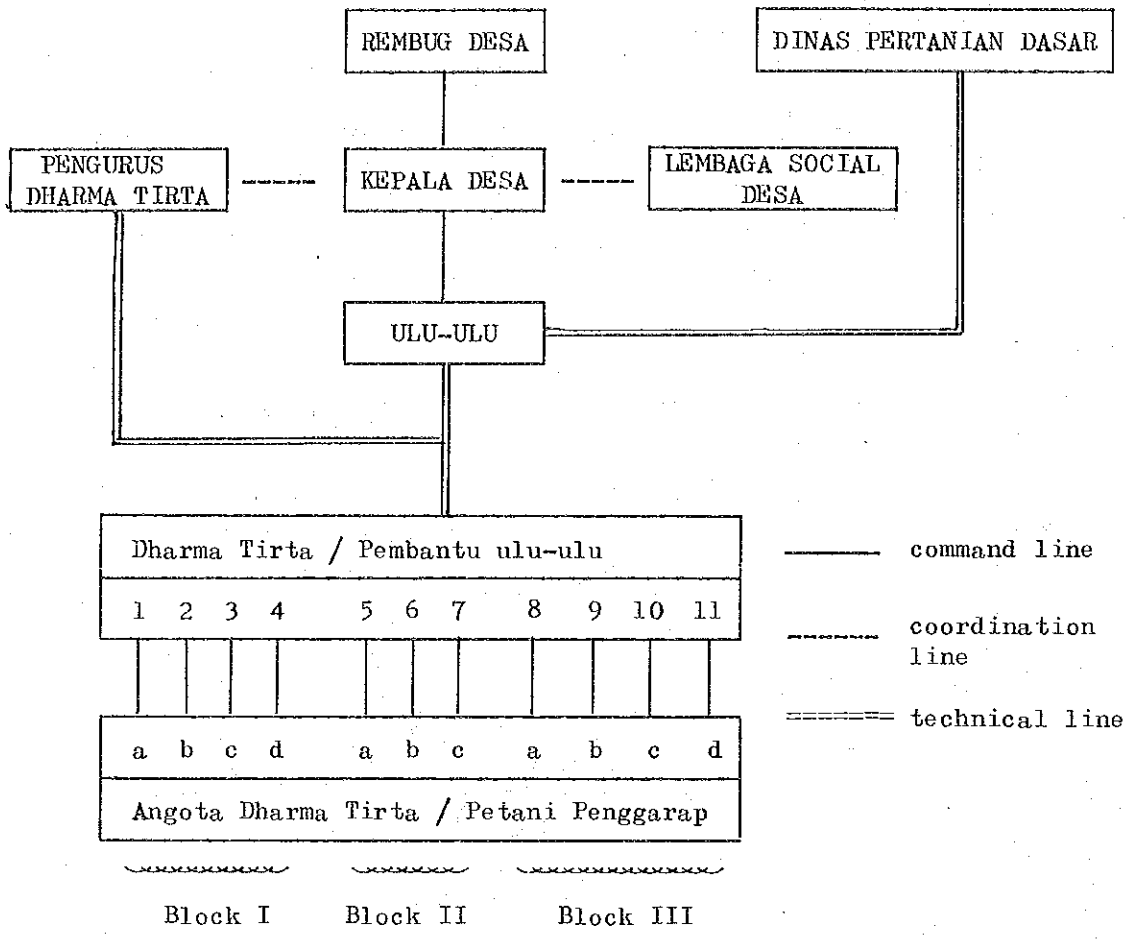
	Block I	Block II	Block III	Total
Area (ha)	123	102	161	386
Membership	374	298	430	1,102

The net benefit which this Dharma Tirta brought about in paddy production is considerable. According to the information provided by Pengurus Dharma Tirta, the differences in productivity before and after full operation of Dharma Tirta are as follows:

	Sown Area (ha)	(*) Before (1950-1970 average)	(*) After 1971	(*) Increase	Increase (%)
Rainy season paddy	280	83.5	131.1	47.60	55
Gogo	100	51.1	63.8	12.72	25
Gladu walik	100	56.25	87.8	31.55	52
Gadu	280	56.75	76.9	20.12	37

(*) = Quintals in wet stalked paddy

4.1 THE ORGANIZATIONAL SETUP OF PURO DHARMA TIRTA



4.2 FUNCITIONAL ASPECT OF RURO DHARMA TIRTA

Pengurus Dharma Tirta is its headquarters, consisting of 3 ulu-ulu desa and 11 pembantu ulu-ulu from 3 desas. It has one chairman, one secretary and one treasurer. It is responsible to the villages on all irrigation water and functions as follows:

- to plan irrigation of 3 villages as a whole;
- to control and regulate water distribution on fairness;
- to maintain the irrigation facilities;
- to construct and rehabilitate the canals and other irrigation facilities through the villagers' gotong royong;

- to propagate agricultural technique and knowledge, especially of cultivation and irrigation;

- to collect contributions and funds for maintenance and development of the irrigation facilities;

- to set realize the regulations and punishments to its members.

4.3 FINANCIAL ASPECT OF PURO DHARMA TIRTA

Dharma Tirta members contribute 20 kg and 15 kg per ha. (in dry stalkpaddy) for dry season and rainy season, respectively. Such contributions are distributed upto 75% among the 11 pembantu ulu-ulu as remuneration for their services, 12.5% for other officials(chairman, secretary and treasurer) and 12.5% for canal maintenance, irrigation development, etc. Ulu-ulu desas do not draw anything from these contributions as they are entitled to Bengkok on the Sawah Lunggh Pamong.

4.4 SOCIO-ECONOMIC ANALYSIS

The infrastructural improvement work undertaken by this Dharma Tirta was meant for an all-year-round supply of irrigation water on the equitable distribution basis, but its process the paddyfields originally belonging to the land owning farmers in three desas of Karas, Bolorejo and Puro were made into the recutangular shapes or consolidated as far as topographical conditions allowed. Upon completion of such engineering work, the consolidated paddyfield was subdivided into three Blocks more or less on the line of the old boundary of the village fields, namely, Block I for Karas, Block II for Bolorejo and Block III for Puro. However, blockwise subdivision of the consolidated paddyfield did not exactly coincide with the original village paddyfield.

Taking for an example Block III with an area of 161 ha which is primarily meant for desa Puro. The Dharma Tirta membership allocated for this Block count 430. But out of these 430 members, those domiciled in Puro desa are 342 or about 80% of the total. The remaining 20% of the membership, 88 in number, consist of the landowning farmers from other villages. By the way, the agricultural population of desa Puro can be broken-down as follows:

Petani kenceng	299 ------	
" ½ "	505	--- 342
" gundul	43 ------	
" ngindung	30	
" magersari	12	
	889	

Total number of the landowning farmers is 342 and landless peasants count 547.

As Dharma Tirta membership is apparently restricted to the landowning farmers, all 342 are its members from desa Puro. Out of 342 domiciled members, 3 have paddyfield over 1 ha. and the remaining 339 have paddyfield between ½ and 1 ha., in Block III. Assuming that the holdings of the domiciled members and those of non-domiciled members are almost the same, the former jointly occupy approx. 128 ha., while the latter combinedly occupy 33 ha. Among the former's paddyfield, 15 ha. is under Sewah and 5 ha., under Maro.

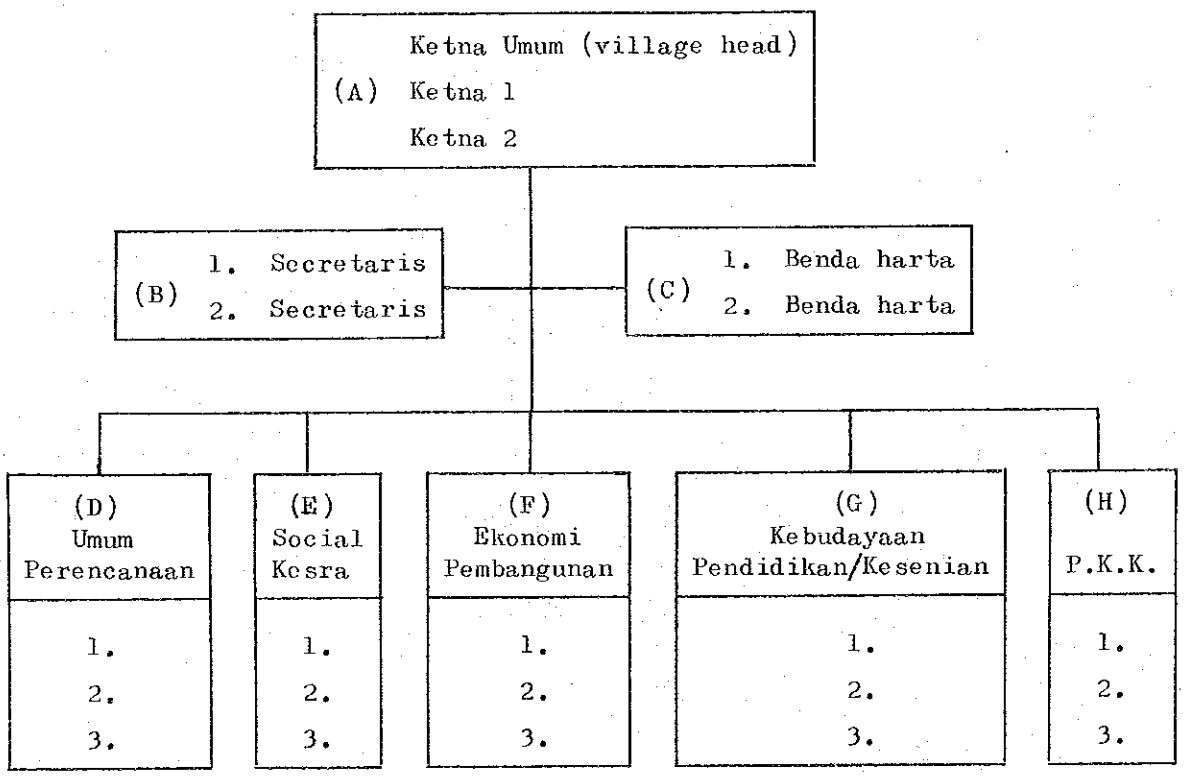
Taking the whole Dharma Tirta as one, out of its total command area of 386 ha., only 55 ha. or 14% was cultivated under Bimas (Baru) during 1974 - 75 wet season, when about 150 ha. or less than 40% of the total paddyfield was cultivated under Inmas. Bimas/Inmas area was 205 ha. or approximately 53% of the total paddyfield; during 1975 dry season, it was reported that about 50% of the land was covered by Bimas Baru but could not have been confirmed.

The above findings suggest that in Puro Dharma Tirta, although its physical infrastructures seem to be in good conditions, the agricultural operation does not commensurate to them. In other words, well prepared physical infrastructures are not fully utilized for production-increase of paddy as judged from the low level of utilizing Bimas/Inmas. The example of Puro Dharma Tirta is a fine pointer to the fact that Dharma Tirta can be only one of the two wheels of the vehicle, and unless another wheel, that is, Koperasi, is well organized and efficiently serve in credit, input supply, technical guidance and marketing/processing, the agricultural productivity in general will not be sufficiently raised.

5. LEMBAGA SOCIAL DESA

It would not be far removed from the reality ruling in the village community (desa) in the project area to say that their future socio-economic development would be very much facilitated by encouraging a healthy growth of three kinds of village institutions as follows: (i) village multi-purpose cooperative society, (ii) Dharma Tirta, and (iii) Lembaga Social Desa. As (i) and (ii) of these institutions have already been dealt with, at least in their outlines, in the preceding pages, the last-mentioned institution, that is Lembaga Social Desa, will be taken up, from the developmental point of view.

The concept of the Lembaga Social Desa as one of the machinery workable for rural development was given by the Presidential decree issued in 1974 and, administratively speaking, it is linked to the Home Ministry (Directorate General Rural Development) via BAPPEDA (Badan Perencanaan Dan Pembangunan Daerah) at propinsi-level and UDKP (Unit Daerah Kerja Pembangunan) at Kecamatan-level. Lembaga Social Desa is an advisory body to Lurah (village head) and its members are appointed by Bupati (Kabupaten head); its organizational setup is roughly as follows:



English equivalent of each component part of the organization may read as follows:

(A) = Group of Chairman
(B) = Secretariate
(C) = Treasury

(D) = Planning
(E) = Social Welfare
(F) = Economic Development
(G) = Culture, Education, Arts
(H) = Family Prosperity & Discipline

Its staffing and functioning will be introduced from a case-study at Sidodadi, a desa in kecamatan Masaran which belongs to Kabupaten Sragen:

Ketna Umum ..... Village head
Ketna Umum 1 ..... Head-master of primary school
Ketan Umum 2 ..... - do -

Secretaris 1 ..... Teacher
Secretaris 2 ..... Teacher
Benda Harta 1 ..... Teacher
Benda Harta 2 ..... Teacher

Umum Perencanaan (Planning)

Member 1 ..... Teacher/farmer
" 2 ..... Popular farmer
" 3 ..... - do -

Social Kesra (Social Welfare)

Member 1 ..... Health (mantri)
" 2 ..... Teacher
" 3 ..... Irrigation officer

Ekonomi Pembangunan (Economic Development)

Member 1 ..... Teacher
" 2 ..... Farmer
" 3 ..... Block head

Kebudayaan Pendidikan/Kesenian (Culture, Education, Arts)

Member 1 ..... Teacher
" 2 ..... Teacher
" 3 ..... Sportsman

P.K.K. (Family Prosperity & Discipline)

Member 1 ..... Village-head's wife
" 2 ..... Teacher's wife
" 3 ..... Irrigation mantri's wife

It is interesting to know that our of 21 members excluding Ketna umum (village head himself) who presides over the LSD, 11 or a majority consist of teachers (2 of them are head-masters of the primary schools in the village) and that P.K.K. is made up entirely of the married ladies. As for the teacher-members of the LSD, there are three primary schools in the village, with a combined pupils of nearly 500 belonging to the age-group of 8-14 years and they are taught by 19 teachers in all, and one kindergarten with 20 children under one master. Besides 2 head-masters out of 3 primary schools, half as many primary school teachers are being assigned with the honourable duty of advising the village-head in execution of his administrative work. While 2 head-masters are assuming the post of Vice-chairman, the secretariate and the treasury are exclusively made up of teachers, and there is no sub-committee which has no teacher or teacher's wife among its constitutent members. Apart from P.K.K. which is a female sub-comt., there is one village doctor, one irrigation officer, one block head (kabaj) plus one prominent sportsman, besides the teachers. P.K.K. which is specializing on the Family Prosperity and Discipline consist of 3 members: the wives of lurah, teacher and mantri-pengairan.

While the general meeting of the villagers (Lembaga Desa) is normally held only once a year excepting, of course, the time of emergency or of particular need when it must be held as often as required, the LSD meets at least once a month as an advisory body to the village head, and discuss about and decide on (formally, advise the village-head to decide) many important issues for the socio-economic and cultural development of the whole village. Possibly one of the vital-most functions will be that related to the village budget, that is, the revenue and expenditure.

In Indonesian villages, their government consist of the Pamong Desa, the village office-bearers such as Lurah, Tjarik, Kebaj, Ulu-ulu, Tani, Modin, etc., the total number of which varies according to the size of the village both in terms of population and land space. When it is a big village, Kabaji or the block-head and ulu-ulu or the village office-bearer responsible for water management will be required in plural. Generally speaking, Pamong Tani Desa in charge of agricultural production and Modin, a religious figure, serve single-handedly irrespective of the size of the population or the land. As they are paid for their duty in terms of the proceeds from the Lunguh Pamong Desa or the village land (paddyfield and upland field) during their

term of office, the village revenue is mainly purported for maintenance of the public properties and development works. In the case of Sidodadi village, the revenue during the fiscal year of 1975/76 was Rp.1,350,000 which can be broken down as follows:

Subsidies from the Government	Rp.	300,000
Sawah Kas Desa		350,000
Contributions		700,000
	Rp.	1,350,000

On the other hand, the biggest head of expenditure was "irrigation development" by 70%, to be followed by "road maintenance" and P.K.K. (mostly in connection with family planning) to the extents of 20% and 10%, respectively.

The village expenditure directed at irrigation development upto about 70% of the total or Rp.945,000 in terms of the local currency is supposed to consist of the net cost or capital investment, as most of the labor required for the purpose must have been recruited free from amongst the villagers. As Sidodadi village has 295.6 ha. of paddyfield, we can assume that the net amount spent for irrigation development approximates at Rp.3,200 per ha. Such must be one of the most important factors to allow Sidodadi farmers to raise 6 tons of paddy (wet stalked paddy) per ha. during wet season. As has been said earlier in the main report, we can confidently say that where and when the village Lembaga Social Desa is strong and well-represented, water management and maintenance of irrigation facilities are generally in good shape due to the favorable climate created by the Lembaga Social Desa; thus LSD is expected to fulfil the role of supporting the village Dharma Tirta and it is very much hoped for that LSD will likewise render full support for organization of the village multi-purpose cooperative society and its healthy growth.

As for P.K.K. activities of Sidodadi LSD, it seems that more intensive family planning compaign is required as only 78 married women or 10% of the village women-folk in the age-groupof 15-50 (772 in total) are adhering to birth-control at present.

6. SHORT-CUTTING OF THE BENGAWAN SALA AND THE POSSIBLE IMPACTS ON THE COMMUNAL LIFE OF THE VILLAGERS

More than 50 kampongs belonging to some 30 desas along the Bengawan Sala, starting from Nambangan near Colo down to Grogol, will be either cut into two halves or have a part of them cut off from the main village or put away from the river into the interior, when the proposed flood control work which is going to be implemented on the principle of streamling the present meandering course of the Bengawan Sala between the above-said section. This paper contains a gist of the case-study results at Nambangan village in Kecamatan Selogiri of kabupaten Klaten, which will be cut into two parts by the short cutting work.

6.1 AREA AND POPULATION

The total area of the village (327 ha) is made up of the rainfed paddyfield by nearly 60% (192.4 ha), of Tegal and yard by about 33% (109.4 ha), and the remaining 7% (25.0 ha) consists of the others. Because of a lack of artificial irrigation facilities, paddy cultivation is restricted only during the wet season; its dry season cultivation in about 5 ha by utilizing the water available from a few brooklets is indeed negligible. As there seems to exist no industry worth its name in this village, its 603 families (hearth-wise) are making their living mainly by farming very much limited space of land (0.25 ha of rainfed paddyfield plus 0.17 ha of tegal, per family) and by raising cattles and fowls.

6.2 AGRICULTURAL PRACTICES

During the wet season, an intensive paddy cultivation under BIMAS credit was carried on in 104 ha or 54% of the total rainfed area of 192 ha, but its yield remained at the level of 38 quintals per ha (in 1975/76); in the same wet season, the productivity of non-BIMAS area was a little more than 30 quintals/ha (both in wet stalked paddy). Tenure system prevalent for wet season paddy cultivation can be classified into 3 kinds: Sewah (rental being Rp.50,000/ha), Maro (50:50) and own-farming. Their share and productivity is as follows:

Sewah	on 50% of the paddyfield	@38 quintals/ha
Maro	on 25% of the paddyfield	@35 quintals/ha
Own-farming	on 25% of the paddyfield	@40 quintals/ha

The upland is sown with cassave, soybean and other pulses during the wet season.

Because of these basic handicaps in expanding paddy and polowijo production, the villagers are very eager in animal husbandry; compared with a village of the similar size on the plain, the animal and fowl population in Nambangan village is well over two-times bigger.

6.3 VILLAGE CHARACTERISTICS

Nambangan village now occupies the place which is agriculturally quite unfavourable; all its paddyfield remains rainfed and its size is as small as 0.054 ha per villager. In spite, or rather exactly because, of such low productivity, so-called Sawah Lungguh Pamong (40.2 ha) occupies, together with Sawah Kas Desa (4.18 ha), almost a quarter of the total village paddyfield (exactly, 23%) and, as if it is still insufficient, one-third of its upland (only 5 ha in total) is reserved as Tegal Kas Desa; in the villages on the plain, the area reserved for Sawah Kas Desa and Sawah Lungguh Pamong combined seldomly exceeds 7% of the entire paddyfield belonging to them and Tegal Kas Desa only remains in their past memory. From the scholastic view-points from the political science and sociology, the current land operational ratio between government and civil in Nambangan village reminds us of the feudalistic pattern once ruling both in Europe and Japan.

6.4 TWO PARTS OF THE VILLAGE AFTER SHORT-CUTTING

The part which will be cut off from the rest of the village will be approximately 115 ha and administratively covers 3 kebayan (blocks) of Bulak, Nambangan and Ngepos, whose population is as follows:

	Adult		Young		
	Man	Woman	Boys	Girls	Total
Bulak	58	68	79	73	278
Nambangan	123	148	168	154	593
Ngepos	82	86	115	99	382
	263	302	362	326	1,253

From both land and population points of view, the short-cut portion of the village corresponds to one-third of the entire village. In this part of the village there are one mosque, one Muslim school and one of the two government primary schools of the village. This pattern of distribution of the cultural facilities show that the very part of the village which will be lost from the rest of Nambangan

has been the cultural center and it is assumed that it was once economically very important as well, though many, many years ago, being equipped with good facilities for loading of the local products and unloading of the merchandize from afar and accommodations for passengers who prefered travel by boat to difficult voyage along the-then under-developed roads, when the Bengawan Sala was serving as an artery of traffic and transportation in the upper Sala basin. It is indeed the world-wide phenomenon that the cultural assets usually remain where economic prosperity was enjoyed for a considerable duration of time. Since the decline of the importance of the Bengawan Sala as the means of transport and communication, the headland in question began losing its authority but the village developed southward within an area which corresponds to twice as large the original one and, yet, the entire village still pays homage to the old center by retaining the name of one of the duluhs in the short-cut portion.

Through the recent feasibility study, two sectors of "irrigation" and "river improvement" have been considerably upgraded in their accuracy and became bearable to the rigid appraisals from both technical and financial aspects. Unfortunately for Nambangan village, while the river improvement work will cut into two parts, the Dengkeng main canal is aligned immediately north of it and, therefore, no benefit is expected out of the irrigation project. Could this village hope to be irrigated all through the year under the new irrigation project, it would experience an enormous economic impetus on both sides of the short-cut river route which should work upon the tenure system as well as the government-civil land operational ratio for change either slowly or quickly. Nothing of this sort would happen as Nambangan village is going to be cut into two parts without getting any benefit in irrigation aspect.

Under these circumstances, the announcement of short-cutting in the name of the river improvement work will be received by the villagers with a mixed feeling; the people living in the head land to be cut off from the main part of the village are supposed to be "santri" by themselves or mostly under the strong influences of "santri", while the people in the other part, mostly "abangan" and it is reported that there are 4 Catholic families there. The villagers in the larger part know that the flood damage will be greatly mitigated by short-cutting and the office-bearers of the village government know that their Sawah Lunggh Pamong which is exclusively in this part of the village will benefit from flood control work. Therefore, it is imagined that short-cutting will be seriously opposed by one-third of the villgers who are domiciled in the headland to be cut off but heartily welcomed by two-thirds of the villagers who will remain in the larger part of it.

Provided that the existing bridge on the Bengawan Sala will be left unremoved even after short-cutting and a new bridge will be build on the short-cut river route along the same old provincial road, the separation of the headland will bring no serious administrative,

economic, social and cultural changes to the both parts of Nambangan village. However, if a new bridge to span the short-cut valley will be built, either from engineering considerations or otherwise, at other place along the detour route away from the present provincial road, the cut-off portion will be socio-economically isolated, though administratively remaining in Nambangan, from the other part of the village and will lose its cultural dignity once enjoyed all over the united village. Should the existing bridge across the Bengawan Sala with its one end at the cut-off headland be removed, 3 kebayan of Bulak, Nambangan and Ngepos would be cut off from the other bank also and virtually remain an isle thus intensifying their socio-cultural isolation and almost completely stifling their economic development potential. Such can not but make the people there more "anti-abangan" and to find out political solution to their difficulties they might resort to the activities skin to those adopted by the once-active Nafdatur Ulama thus causing not a small disturbance to the political climate in this part of the Central Java.

Some Particulars of village Nambangan, kecamatan Selogiri, kabupaten Klaten

1. Population (as of February 1976)

Duluh	Adult		Young		Total
	Man	Woman	Boy	Girl	
Nambangan	123	148	168	154	593
Ngepos	82	86	115	99	382
Godungan	100	130	154	127	511
Bulak	58	68	79	73	278
Kalikatir	158	158	182	180	678
Pulorejo	124	138	148	156	566
Nangger	134	144	156	140	574
Total	779	872	1,002	929	3,582

2. Land Use (ha)

		Sawah kas desa	Sawah lunggh pamong	Tegal kas desa	Sawah pituas	Privately owned
Rainfed paddy-field	192.4420	4.1800	40.2000			148.0620
Yard	104.3805					104.3805
Upland	4.9900			1.6385		3.3515
Others	25.0455					
	326.8580	4.1800	40.2000	1.6385		255.7940

3. Sawah Lunggh Pamong

Lurah	(village head)	.....	9.2 ha
Cerik desa	(secretary)	.....	6.1 "
Modin	(religious)	.....	3.1 "
Kebajan 1	(block head 1)	.....	2.9 "
" 2	(" 2)	.....	3.1 "
" 3	(" 3)	.....	3.4 "
" 4	(" 4)	.....	2.7 "
" 5	(" 5)	.....	2.5 "
" 6	(" 6)	.....	2.4 "
" 7	(" 7)	.....	2.4 "
Ulu-ulu desa	(water management)	.....	1.0 "
Pamong tani desa	(agriculture)	.....	0.7 "
Tojoboyo	(security)	.....	0.7 "
			40.2 ha

4. Animal Husbandary

	He	She	Total	She/He
Cow	26	156	182	6.0
Buffalo	1	2	3	2.0
Horse	1	2	3	2.0
Goat	76	165	241	2.2
Swine	21	48	69	2.3
Chicken (improved)	40	75	115	1.9
- do - (local variety)	227	2,736	2,963	12.0

5. Administrative Division

Kebayan (block)		Duluh
I.	Pulorejo	1. Pulorejo
		2. Balerejo
		3. Puluhon
		4. Badran Puluhon
II.	Kalikatir	5. Kalikatir
		6. Kerdu
		7. Tumuwah
III.	Nangger	8. Nangger
		9. Purwodadi
IV.	Bulak	10. Bulak
V.	Godungan	11. Pasarejo
		12. Godungan
VI.	Nambangan	13. Nambangan
VII.	Ngopos	14. Ngepos

6. Villagers' Status

Kulikenceng	 215		
½ "	 329		
Magersari (rumah)	 44	Kepala rumah	 582
Mondok	 15	R.T.	 21
	603		603

Table II-1 OPERATION MAINTENANCE ORGANIZATION OF THE EXISTING IRRIGATION FACILITIES

(As of March 1976)

No.	SEKSI	RANTING	KEMANTREN	NAME OF DIVERSION WEIR	NAME OF TRIBUTARY	AREA (HA)	KEPALA RANTING (ranting head)	MANTRI PENGAIRAN (report supervisor)	JURU PINTU (gate operator)	PENJAGA SALURAN (canal-rider)	ULU-ULU DESA
1	Karang Anyar	Sukoharjo	Bengajah	B. Ambil-ambil	K. Ambil-ambil	1649	1	1	1	24	68
2				B. Geneng	K. Jlantah				1		
3			Sukoharjo	B. Pepen	K. Jlantah	660,53	....	1	1		
4			Tagalsari	B. Langsir	K. Nglangsur	1383,57	....	1	-		
5		Bekonang	Kepuh wetan	B. Dari	K. Kumet	727,07	1	1	1	15	28
6			Kepuh kulon	B. Kaliduren	K. Bening	636,35			1		
7				B. Gembong	K. Gembong	373,44		1	1		
8			Kuntungan	B. Trani	K. Samin						
9				B. Pancuran	K. Cabak	1062,38		1	-		
10			Wirun	B. Karang	K. Cabak						
11		Karanganyar	Canden	B. Palur	K. Bibis	878,03	1	1	-	29	28
12				B. Jumok	K. Gandu	877,48		1	1		
13			Jaten	B. Dukuk	K. Gandu						
14		Tasik madu	Tasik madu	B. Kalongan	K. Wulun	753,39	1		1	23	24
15			Silamat	B. Jongkang	K. Gabahan	623,74		1			
16				B. Kebak	Afvoer Siwaluh						
17			Kemiri	B. Lungge	"	745,18		1	-		
18			Nggrompol	B. Pengin	K. Tempuran	897,86		1	1		
19			Kaliwuluh	B. Ledok	K. Grompol	632,84			1		
20				B. Banjarsari	K. Grompol				-		
21	Sragen	Brambang	Masaran	B. Craken	K. Craken	213,4	1	4	9	7	25
22			Gebang	B. Kedunggatot	K. Karang	2004,7					
23				B. Kedung gawe	K. Tambangan						
24			Masaran	B. Krikilan	Afvoer Prampalan	1,210.8					
25			Gebang	B. Gebang	K. Mungkung	459					
26		Sragen	Ngarum	B. Bonggo	K. Kenatan	2,388.4	1	11	18	12	41
27			Ngablak	B. Sepreh	K. Kenatan						
28				B. Kanas	K. Kenatan						
29			Nglorok	B. Krapyak	K. Sragen	367					
30				B. Randu	K. Ngrandu	219.6					
31			Pilangsari	B. Maron	K. Ngrandu	74					
32			Ngarum	B. Ngarum	K. Ngarum	603.3					

No.	SEKSI	RANTING	KEMANTREN	NAME OF DIVERSION WEIR	NAME OF TRIBUTARY	AREA (HA)	KEPALA RANTING (ranting head)	MANTRI PENGAIRAN (report supervisor)	JURU PINTU (gate operator)	PENJAGA SALURAN (canal-rider)	ULU-ULU DESA
33	Sragen	Sragen	Pilangsari	B. Klenteng	K. Ngampunan	965.4					
34		Kedungbanteng	Sambungblader	B. Kedungsong	K. Bajut	212.43	1	6	10	9	25
35				B. Nangsri	K. Mojoranu/ Bayanah	133.47					
36			Tunggul	B. Kedungduren	K. Sawur	-					
37				B. Winong	K. Sawur	757.91					
38			Trobayah	B. Piji	K. Sawur	1,734.50					
39	Karanganyar	Sukoharjo	Bulu	B. Garotan	K. Paijinan	319	1	1	1	24	68
40	(Left Bank of the Bengawan Sala)			B. Jatimalang	K. Dewung	235.33					
41			Tawangsari	B. Pencit	K. Dengkeng	-		1	1		
	TOTAL					24,997.1	8	30	51	143	307

(1) Seksi Karanganyar covers the areas administratively belonging to Kabupaten Karanganyar, Sukoharjo and Wonogiri.

(2) Area covers Technical and Semi Technical Sawah.

(3) On an average, 1 Canal Rider looks after 3 km length of the canal (main and secondary).

(4) The number of Ulu-ulu desa in each Ranting who are coming under the technical guidance of the Seksi.

Sources: Kantor Pengairan Wilayah, Surakarta & Kantor Pengairan Seksi in Sragen and Karanganyar.

Table II-2 BIMAS (BARU & BIASA COMBINED) CREDIT & ITS RECOVERY RATES FOR 1974-1975

Kabupaten*	Kecamatan	B. R. I.		Loans provided under "Bimas" & their recovery rate							
				1974 - 1975 (rainy season)				1975 (dry season)			
		Branch	Staff	Ha	Amount (Rp.)	Repaid (Rp.)	%	Ha	Amount (Rp.)	Repaid (Rp.)	%
Sragen	Sambungmacan	2	6	2,142	32,907,486	Kecamatan - wise figures have been made available only with afew of them Kabupaten recovery rate is daimed to be around 50%	50	450	11,122,527	1,333,485	12.0
	Gondang	2	6	2,470	48,743,854			165	8,737,800	1,997,075	22.9
	Ngrampal	2	6	2,794	41,855,670			325	2,793,650	-	-
	Sragen	2	6	1,854	31,190,265			200	3,868,870	475,845	12.3
	Karangmalang	2	6	2,606	40,959,415			340	8,104,900	1,702,490	21.0
	Sidoharjo	3	9	4,036	57,876,770			147	3,297,200	207,700	6.3
	Masaran	2	6	2,231	42,444,531			160	6,118,134	263,866	4.3
Karanganyar	Kebakramat	1	3	1,160	22,008,400			445	11,061,600	-	-
	Jaten	1	3	999	21,624,723			358	10,017,125	-	-
Sukoharjo	Mojolaban	2	6	2,428	42,628,100	36,643,267	86.0	1,096	24,595,300	14,734,445	59.9
	Pokokarto	2	6	2,155	39,053,675	31,206,225	79.9	452	11,611,300	7,465,265	64.3
	Bendosari	2	6	2,372	36,055,100	19,325,050	53.6	831	18,445,150	8,678,620	47.0
	Sukoharjo	2	6	2,700	48,140,940	15,385,006	32.0	1,279	27,047,775	10,714,944	39.6
	Nguter	2	6	1,319	23,559,025	14,286,725	60.6	147	2,892,850	1,274,430	44.1
	Bulu	1	3	1,207	24,987,400	9,210,685	36.9	23	466,500	338,865	72.6
	Tawangsari	1	3	754	12,985,580	2,407,924	18.5	56	1,194,100	163,500	13.7
	Weru	1	3	906	17,545,500	13,727,010	78.2	34	663,000	220,540	33.3
Klaten	Karangdowo	2	6	1,031	-	-	-	795	-	-	-
	Cawas	1	4	1,186	17,373,890	-	-	1,030	23,927,250	-	-

Source: Primarily from Kabupaten offices: confirmation by B.R.I. Surakarta not received by the time of preparation of this table.

* : Kabupaten & Kecamatan which will be covered by the Project's Irrigation improvement scheme either wholly or partially.

Table II-3 UNIT DESAS & THEIR FACILITIES

Kabupaten	Kecamatan	Number of Desa	Number of Unit Desa	Size of Paddy Field (Ha)	Popu-lation	Per Unit Desa		P. P. L.		B.R.I. Branches			Kiosk		Godown		Rice Mill	
						Paddy Field (Ha)	Popu-lation	Number	Paddy Field per PPL (Ha)	Number	Number of Staff	Bimas Credit Handled per Staff (Rp.)	Num-ber	Urea Supplied during 1974-1975 (tons)	Number	Capacity (Tons)	Number	Capacity (Qw/hour)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Sragen	Sambungmacan	9	2	2,538.5	36,231	1,269	18,116	2	1,269	2	6	7,338	T/1	542.4	P/2	600	1	3.5
	Gondang	9	2	2,569.6	36,933	1,285	18,467	2	1,285	2	6	8,432	T/1	577.2	P/1	300	-	-
	Ngrampal	8	2	2,395.3	31,936	1,198	15,968	2	1,198	2	6	8,590	T/1	827.5	P/2	600	1	3.5
	Sragen	5	2	1,577.0	53,597	789	26,799	2	789	2	6	5,843	T/1	361.9	P/1	300	-	-
	Karangmalang	10	2	3,191.6	41,807	1,596	20,904	3	1,064	2	6	8,177	T/1	592.7	P/2	600	2	3.5
	Sidoharjd	11	3	3,431.0	39,848	1,144	13,283	2	1,716	2	9	6,797	T/1	799.7	P/2	600	-	-
	Masaran	13	3	3,061.5	46,969	1,021	15,656	3	1,021	2	6	8,094	T/1	26.7	P/2	600	-	-
Karanganyar	Kebakramat	10	1	2,389.7	34,201	2,390	34,201	1	2,390	1	3	11,023	T/5	324.9	T/1	300	1	3.5
	Jaten	8	1	1,730.0	26,805	1,730	26,805	2	865	1	3		P/1	307.3	P/1	400	1	3.5
Sukoharjo	Mojolaban	15	2	2,518.9	46,555	1,259	23,278	2	1,259	2	6	11,204	P/1	712.0	P/1	200	-	3
	Polokarto	17	2	2,503.1	49,298	1,252	24,649	2	1,252	2	6	8,444	P/1	530.7	-	-	-	-
	Bendosari	14	2	2,586.8	43,312	1,293	21,656	2	1,293	2	6	9,083	-	599.4	-	-	-	-
	Sukoharjo	14	2	3,058.2	56,422	1,529	28,211	2	1,529	2	6	12,531	P/1	841.0	P/1	200	-	-
	Nguter	16	2	2,190.8	52,524	1,095	26,262	2	1,095	2	6	4,409	-	266.4	-	-	-	-
	Bulu	12	1	1,095.0	39,130	1,095	39,130	1	1,095	1	3	8,485	-	232.3	-	-	-	-
	Tawangsari	12	1	1,554.1	42,850	1,554	42,850	2	777	1	3	4,727	-	144.4	-	-	-	-
	Weru	13	1	1,453.4	50,813	1,453	50,813	2	727	1	3	6,070	-	170.7	-	-	1	jointly with private
Total / average		196	31	39,844.5	729,231	1,285	23,524	34	1,172	30	90	8,223	T/12 P/4	491.1	P/15 T/1	293.8	8	4

Notes: (1)/(2) : Kabupaten[2] and Kecamatan[2] which are coming under the Project either wholly or partially; Kecamatan Grogol in Kabupaten Sukoharjo and two(2) Kecamatan[2] of Karangdowo and Cawas in Kabupaten Klaten are not included due to lack of consistent figures.

(6) : Population in 1975

(13) : Bimas credit amount provided for 1974-1975 rainy season and 1975 dry season combined (in thousand Rp.).

(14)/(16) : "T" stands for "Temporary" and P stands for permanent; and

(15) : The figures have been taken with urea only (in tons) as an important input item delivered through the Thit Desa during 1974-1975 rainy season and 1975 dry season put together.

Sources : Primarily from Kecamatan offices, suplemented by data provided by relevant government agencies.

Fig. II-1 : RURAL SOCIO ECONOMIC DEVELOPMENT MECHANISM

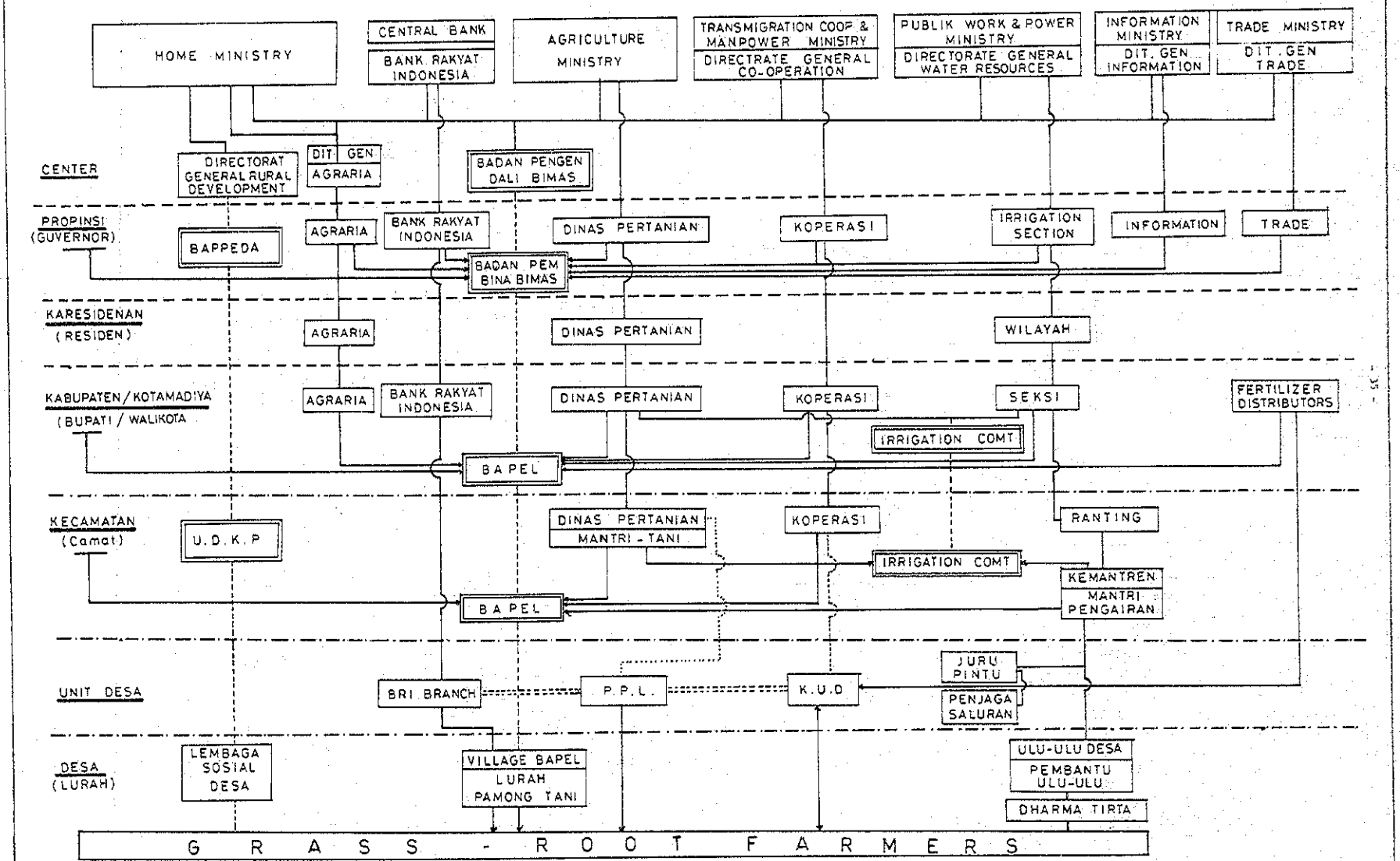
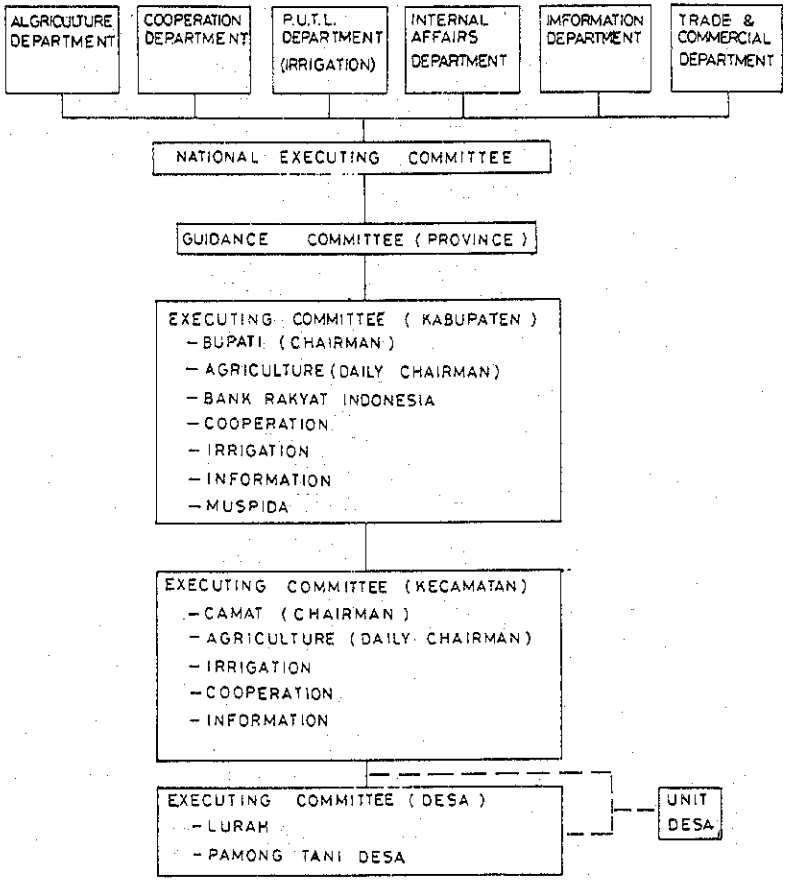


Fig. II-2

ORGANIZATION CHART OF BIMAS PROGRAM



ORGANIZATION CHART OF EXTENSION SERVICE

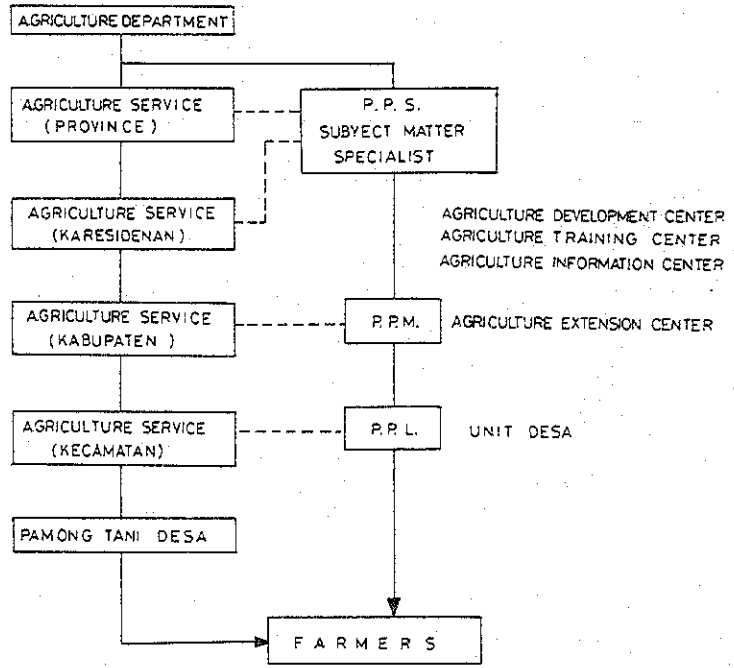


Fig. II-3 ORGANIZATION CHART
P.U SEKSI PENGAIRAN

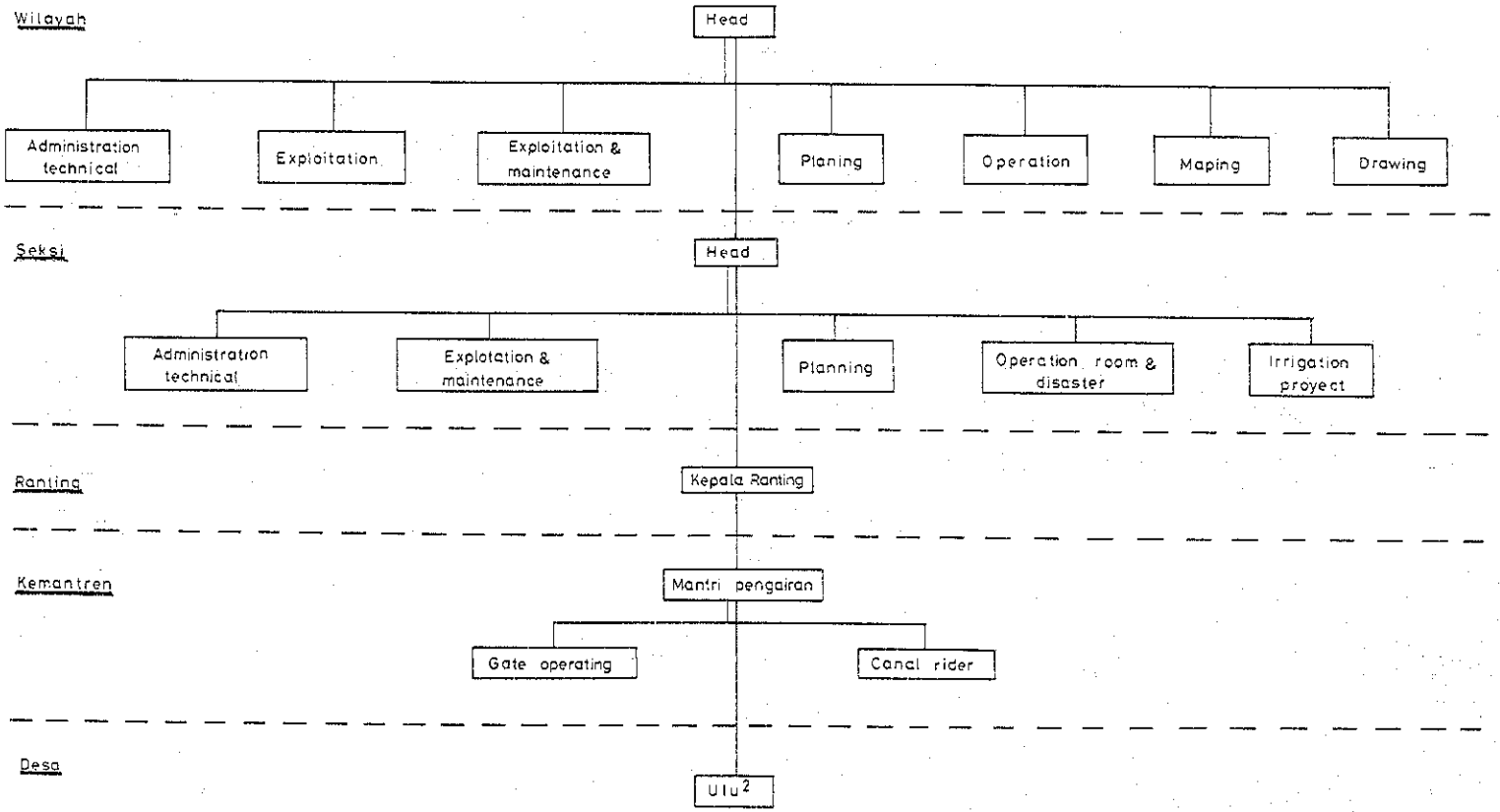


Fig. II-4 ORGANIZATION CHART
DINAS PERTANIAN RAKYAT

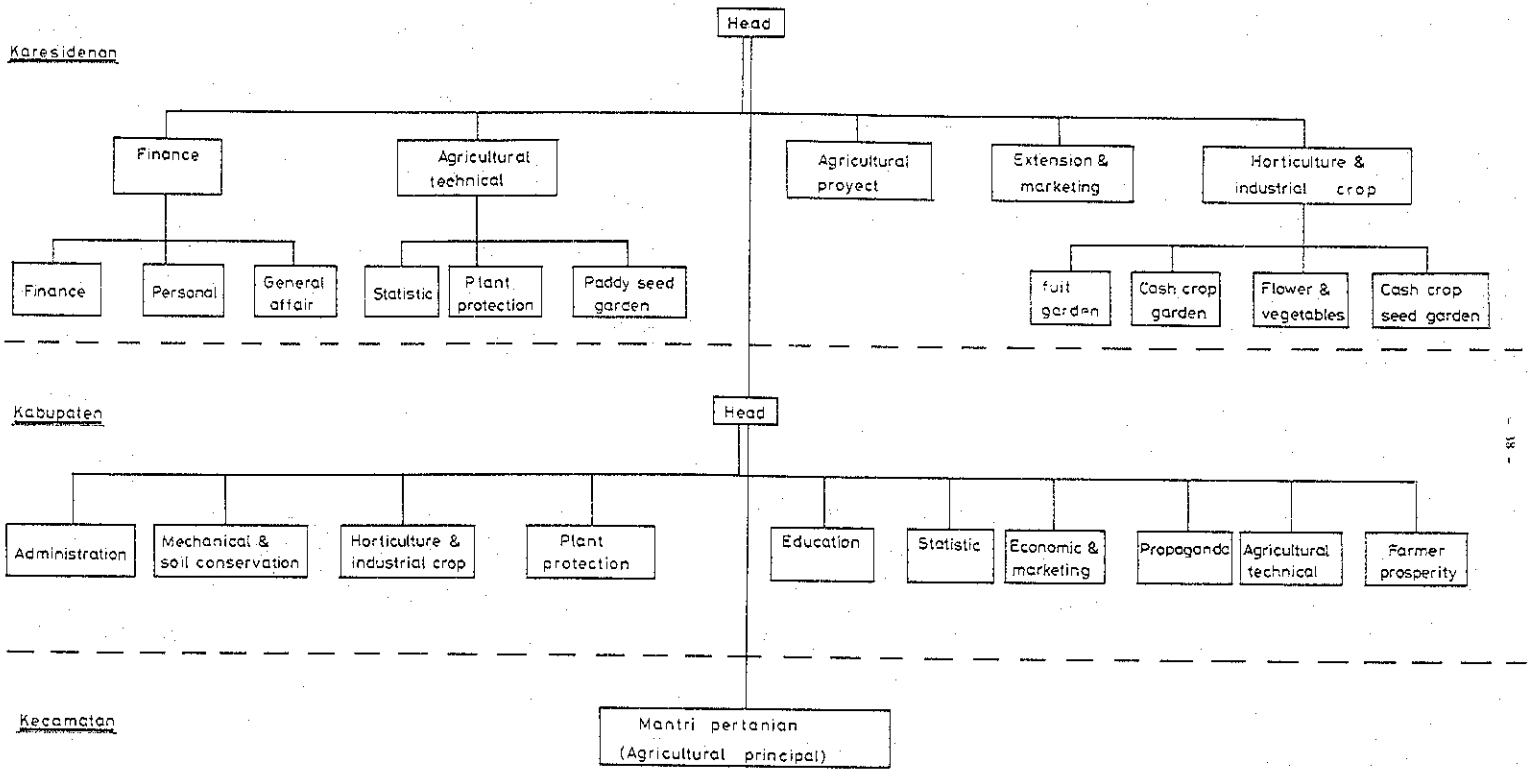
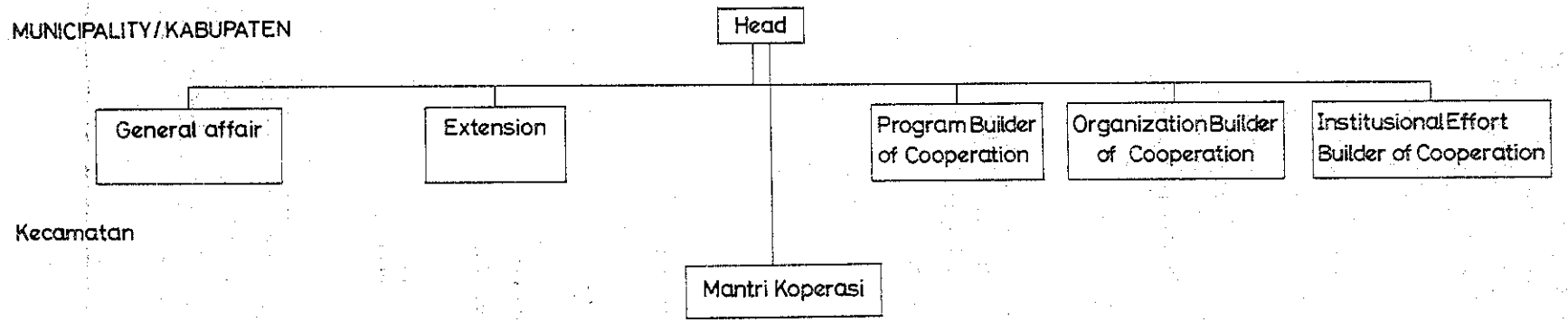


Fig. II-5 ORGANIZATION CHART
JAWATAN KOPERASI



ORGANIZATION CHART
BANK RAKYAT INDONESIA

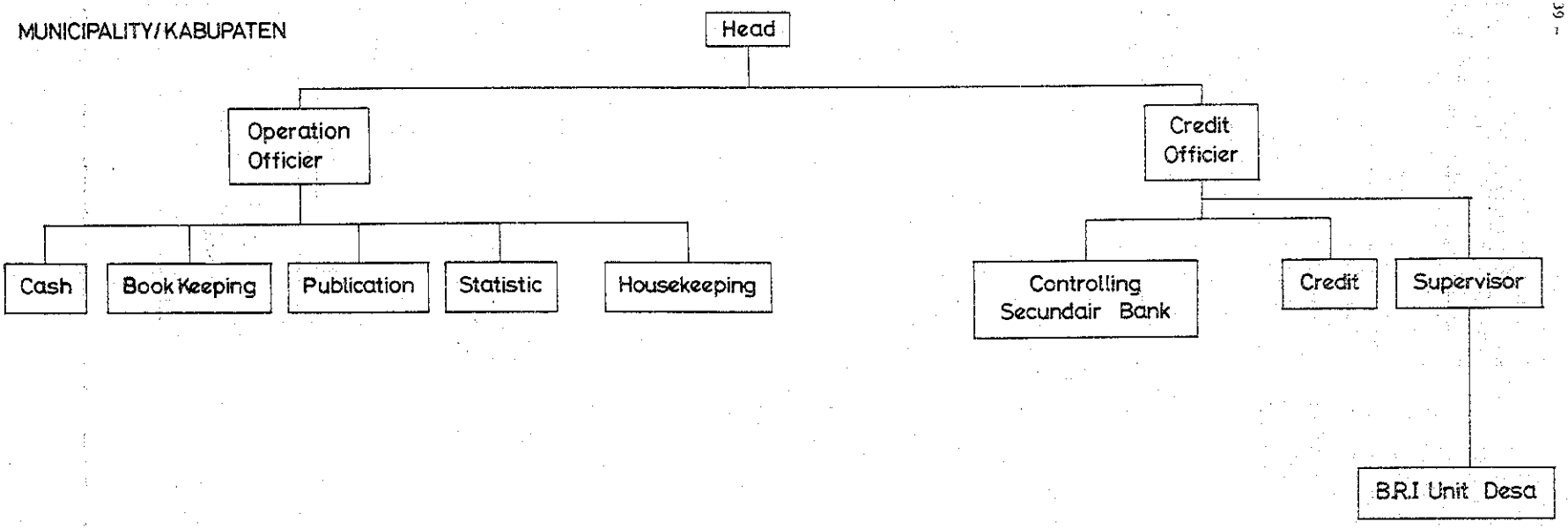
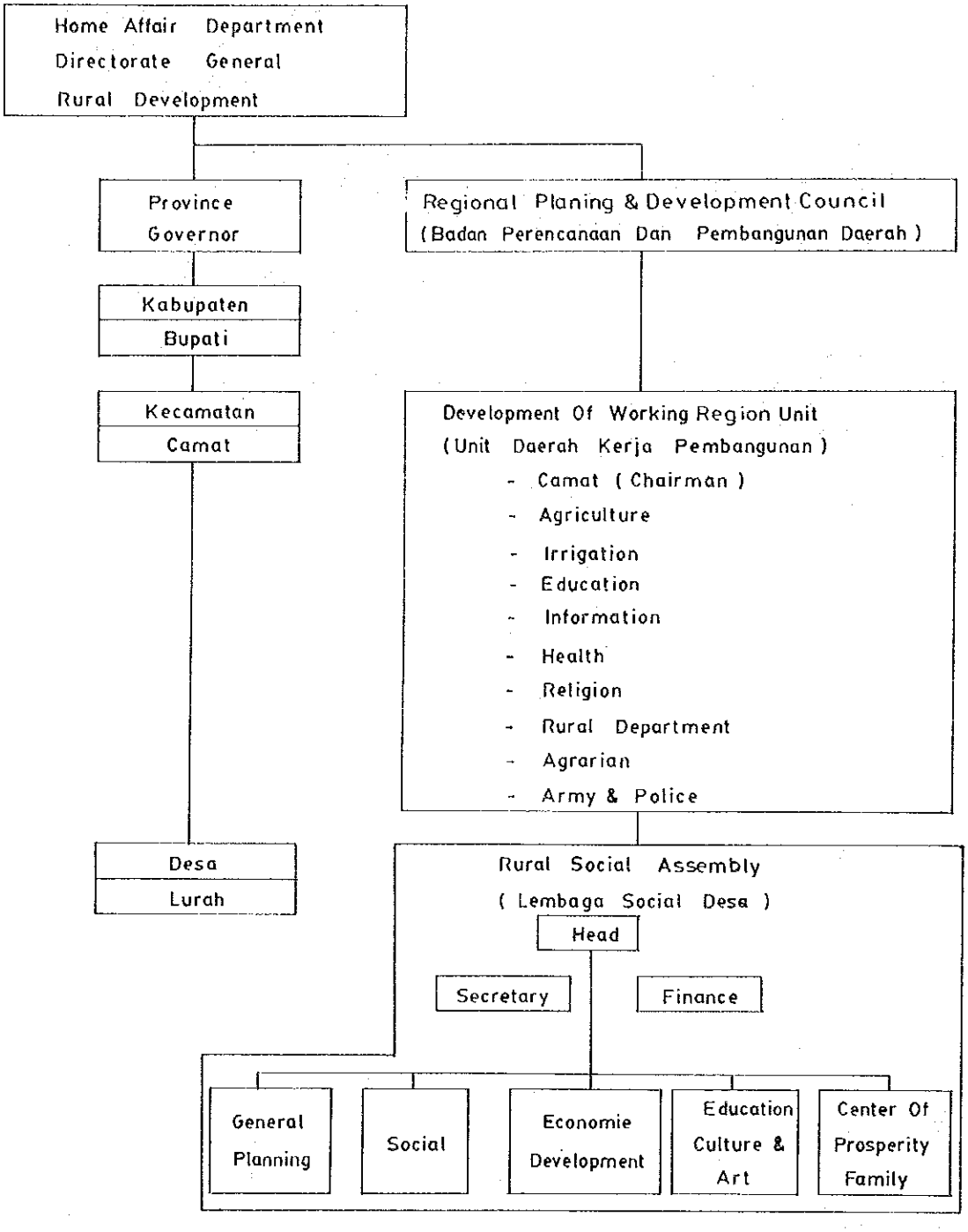


Fig. II-6 ORGANIZATION CHART

SOCIO ECONOMIC DEVELOPMENT



III. PROJECT ECONOMY

TABLE OF CONTENT

PROJECT ECONOMY

LIST OF TABLES

1. ECONOMIC EVALUATION

1.1 GENERAL

The economic feasibility is firstly evaluated by caluculating the internal rate of return for the Wonogiri Multipurpose Dam Project on the basis of the estimated benefit and economic construction cost incorporating the results of the detailed study on irrigation and river improvement.

Secondly, economic feasibility of each purpose is briefly checked by using the allocated cost. In the evaluation, sensitivity analysis is also made with respect to construction cost, price of rice and build-up period of the irrigation benefit.

Costs and benefits to be used in the economic analysis are estimated basically on the basis of the conditions prevailing in early part of 1976. For the construction costs of dam and power station/1, the same costs as estimated in the preceding feasibility study are principally applied except the cost of the land acquisition and the negative benefit for dam and reservoir assuming that the main features of the dam and the power station remain unchanged and that the estimated costs represent the economic cost at present.

In the economic analysis, the cost of cultivated land to be acquired for the implementation of the project is evaluated in terms of negative benefit, which is a loss of the annual benefit expected to accrue from the agricultural production on the area.

All the conversions from Rupiah to Dollar are made at an exchange rate of Rp.415=US$1 and the project life is assumed at 50 years from 1976 - 2025 for the economic evaluation.

1.2 PROJECT BENEFIT

Project benefits comprise two kinds of benefits, namely, primary benefit and secondary benefit. For the calculation of the internal rate of return, only the primary benefit is accounted for.

1.2.1 Primary Benefit

The primary benefit consists of irrigation benefit, flood control benefit and hydropower benefit. Negative benefit on the land to be submerged or to be acquired for the project implementation is also included in the analysis. (Details of the caluculation for the negative benefit is listed in Annex I at the end of this Chapter.)

The summary of the annual benefits is presented as follows.

/1: Final cost estimation of the dam and power will be made by the Detailed Design Survey Team around early 1977.

Table III-1 Summary of Benefit

(10^3 US$)

Item	Annual Amount
Irrigation	17,770
Flood Control	5,540
Hydropower	1,350
Negative Benefit /1	-1,210
Total	23,450

Note /1: Negative Benefit is a loss of the annual benefit expected from the agricultural production on the land to be submerged by the reservoir or to be acquired for the implementation of the project.

For the economic evaluation, the build-up period of the irrigation benefit is assumed at seven years after completion of the irrigation facilities during which the benefit will increase linearly.

Flood control benefit is expected to accure, after the coffer dam is completed and continue to increase stepwise corresponding to the river improvement works until 1983.

Power benefit is anticipated to come out fully after completion of the construction of the power station in early 1981.

Negative benefit will arise from 1977 and attain its full amount in 1982.

1.2.2 Secondary Benefit

In addition to the primary benefit mentioned above, economic benefits are expected to accrue from fishery, recreation and tourism, and municipal water supply. Savings in foreign currency caused by the increased rice production will also give another important benefit on the national economy.

Fishery, recreation and tourism

Having a water surface area of approximately 9,000 ha, the Wonogiri reservoir will provide considerable potentiality for fishery. Surakarta city is a big potential market with a population of about 414,000.

The reservoir will also provide an opportunity for recreation and tourism. Since opportunity for recreation in the project area is rather limited at present, proportional increase in the demand for recreation facilities is expected as the standard of living is improved. The reservoir area is located near Surakarta city, which

is easily accessible by road from Surakarta city and could provide convenient recreation opportunity.

Municipal water supply

It is expected that a considerable benefit will arise in the future from the municipal water supply in Surakarta city. Since the existing water sources for the municipal water supply will not be sufficient to meet the demand, which will increase with population growth and income increase, it will be necessary to cover the shortage by utilizing the water from the reservoir.

Savings of foreign exchange

Upon completion of the project, production of rice (dry stalk paddy) is expected to increase to 272.8 thousand tons from 83.6 thousand tons at present.

As stated in the previous chapter, rice production is not sufficient in Indonesia for satisfying the domestic demand and more than one million tons of rice has been imported to supplement this shortage.

The increase in rice production is, therefore, expected to save the scarce foreign currency in Indonesia through reducing the imports by about 0.1 million tons /1 of rice. The resulting annual savings of foreign currency amount to US$43.29 million /2.

1.3 PROJECT COST

1.3.1 Economic Construction Cost

Economic construction cost is estimated on the basis of the preliminary designs in such a manner that the cost shall reasonably reflect social opportunity costs excluding the effects of import duties and subsidies. Cost of imported plant, equipment and services to be procured by international competitive bidding is based on international price levels. The local cost is estimated taking into account the experience of similar on-going projects in Central Java, Indonesia.

Total economic construction cost is estimated at US$138 million comprising the foreign currency portion of US$67.28 million and the local currency portion of Rp.29,348.8 million (equivalent to US$70.72

/1: (272,800 t - 87,747*t) x 0.52 ≒ 96,200 t

0.52: conversion rate from dry stalk paddy to milled rice

* Refer to Table I-29 Future Crop Production, Appendix III (Agriculture)

/2: 96,200 t x US$450/t = US$43,290,000

US$450/t : Average price of imported rice during Jan. '75 - June '75

million), which includes the cost for the construction of dam, power station and transmission lines, irrigation facilities and river improvement works.

These costs are summarized into Table III-2 and their annual disbursement schedule is presented in Table III-3.

Table III-2 Summary of Economic Construction Cost

(10^3 US$)

Item	Foreign Portion	Local Portion	Total
Dam & Reservoir	18,000	28,700	46,700
Hydropower	10,190	1,510	11,700
Irrigation	23,790	22,910	46,700
River Improvement	15,300	17,600	32,900
Total	67,280	70,720	138,000

The land acquisition cost for dam and reservoir is reevaluated by incorporating the revision made to the areas and the number of houses there on the basis of the results of the second survey conducted by Gadjah Mada University.

The summary of the land acquisition cost is shown in the following table.

Table III-4 Land Acquisition Cost for Wonogiri Dam & Reservoir

Item	Quantity (ha, Nos)	Amount (10^3Rp)
Building		
Bamboo	12,447	871,290
Wooden	11,436	1,715,400
Brick	1,066	479,700
Warehouse	126	31,500
Government Office	L.S.	309,790
Land		
Yard	3,306	1,124,040
Grass land & cemetery	313	46,950
Resettlement Allowances	11,475	1,491,750
Total		6,070,420

(US$14,600,000)

Note: The results of the second survey are used for the quantity of building and land.

Table III-3 Annual Disbursement of Economic Cost

(10^3 US$)

	1976	1977	1978	1979	1980	1981	1982	1983	Total
Dam & Reservoir									
Foreign	1,200	700	3,400	7,800	4,900	-	-	-	18,000
Local	1,000	5,800	8,600	9,800	3,500	-	-	-	28,700
Total	2,200	6,500	12,000	17,600	8,400	-	-	-	46,700
Hydropower									
Foreign	200	-	-	7,080	2,910	-	-	-	10,190
Local	40	-	-	160	1,310	-	-	-	1,510
Total	240	-	-	7,240	4,220	-	-	-	11,700
Irrigation									
Foreign	-	1,200	4,140	5,760	5,250	4,050	3,390	-	23,790
Local	-	150	3,430	4,570	5,390	4,970	4,400	-	22,910
Total	-	1,350	7,570	10,330	10,640	9,020	7,790	-	46,700
River Improvement									
Foreign	-	600	2,410	2,670	2,170	2,380	2,060	3,010	15,300
Local	-	150	2,880	3,120	2,750	3,220	2,470	3,010	17,600
Total	-	750	5,290	5,790	4,920	5,600	4,530	6,020	32,900
Total									
Foreign	1,400	2,500	9,950	23,310	15,230	6,430	5,450	3,010	67,280
Local	1,040	6,100	14,910	17,650	12,950	8,190	6,870	3,010	70,720
Total	2,440	8,600	24,860	40,960	28,180	14,620	12,320	6,020	138,000

1.3.2 Operation, Maintenance and Replacement Costs

Annual cost for operation, maintenance and replacement is estimated at US$0.84 million. The summary of the costs by purposes is presented in the following table.

Table III-5 Annual OM & R Cost

(10^3US$)

Item	Annual Amount
Dam & Reservoir	40
Hydropower	280
Irrigation	340
River Improvement	180
Total	840

1.3.3 Cost Allocation

In order to find the equitable cost for each purpose, allocation of the economic construction cost is made in the following manner.

First, for the hydropower, only the economic cost (US$11,700 million) is allocated, since the hydropower is a secondary purpose of the multipurpose dam project, subordinate to the irrigation.

For the residual cost, allocation is made by means of "Separable Cost-Remaining Benefit Method."

The alternative cost for each purposes is estimated for the comparison with the expected benefits. The estimated alternative cost represents the cost of the most economic single purpose project that can provide the same benefit as the multipurpose project gives. Justifiable expenditure is defined as the least one between the capitalized benefit and the capitalized alternative cost.

Then, the expenditure which could be avoided if one purpose were excluded from the project, is estimated as the separable cost and assigned to that purpose. Remaining justifiable expenditure is given by deducting the separable cost from the justifiable expenditure.

The remaining joint costs of the project are then divided among each purpose in proportion to the remaining justifiable expenditure. The summary of the calculation of the cost allocation is presented in Table III-6, and details are shown in Table III-7.

Table III-6 Allocated Cost

(10^3US$)

Purpose	Foreign Portion	Local Portion	Total
Hydropower	10,190	1,510	11,700
Irrigation	35,140	41,000	76,140
River Improvement	21,950	28,210	50,160
Total	67,280	70,720	138,000

Table III-7 Calculation of Cost Allocation

(10^3US$)

	Item	Irrigation	Flood control	Total
A.	Capitalized Alternative Cost	60,400	52,020	112,420
B.	Capitalized Benefit/1	75,070	38,610	113,680
C.	Justifiable Expenditure (Capitalized)	60,400	38,610	99,010
D.	Capitalized Separable Cost	26,200	19,900	46,100
E.	Remaining Justifiable Expenditure (C - D)	34,200	18,710	52,910
F.	% of the Distribution (E)	64.6	35.4	100
G.	Capitalized Remaining Joint Cost/2 (83,040 x F)	23,860	13,080	36,940
H.	Total Allocated Cost (Capitalized at 1976) G + D	50,060	32,980	83,040
I.	Total Allocated Cost/3 (Economic Construction Cost)	76,140	50,160	126,300

Note: Discount rate of 10 % is used for capitalizing benefits and costs

/1 OM & R cost for each purpose is deducted from benefit before capitalization.

/2 Total capitalized joint cost = Total capitalized cost for the multipurpose dam project excluding hydropower - capitalized separable cost

= US$83,040 million

/3 Capitalized allocated cost (H) is converted to the economic construction cost by using 10 % of discount rate.

1.4 EVALUATION

1.4.1 IRR of the Project

On the basis of the benefits and economic construction costs estimated above, internal rate of return of the Wonogiri Multipurpose Dam Project is calculated at 12.1 % for the project life of 50 years. The rate of return shows economic soundness of the project.

In succession, internal rate of return is calculated for each purpose of the project by using the allocated cost. The results are shown in Table III-8.

Table III-8 IRR of the Project

Purposes	IRR (%)
Irrigation Sector	12.5
River Improvement Sector	11.7
Power Sector	8.9
Wonogiri Multipurpose Dam Project	12.1

The calculated internal rates of return indicate that both irrigation sector and river improvement sector possess substantial economic viability. The power sector is, however, proved to be less economical with its rate of return of 8.9 % only, since the power development is the secondary purpose, subordinate to the irrigation.

1.4.2 Sensitivity Analysis

For the evaluation of the project sensitivity, sensitivity analysis is made with respect to build-up period of the irrigation benefit, price of rice and construction cost.

Internal rates of return are calculated for the following cases and the results are summarized into Table III-9.

Table III-9 Sensitivity Test

Case	Build-up Period of Irrigation (year)	Price of Rice (%)	Construction Cost Increase (%)	IRR (%)
I	0/1	0/2	0/3	12.1
II	+3	0	0	11.0
III	+5	0	0	10.6
IV	0	-10	0	10.9
V	0	-20	0	9.8
VI	0	0	+10	11.2
VII	0	0	+20	10.4
VIII	0	0	+30	9.7
IX	0	-10	+20	9.3
X	0	-20	+30	7.7
XI	+3	-10	+20	8.7
XII	+3	-20	+30	7.3
XIII	+5	-10	+20	8.4
XIV	+5	-20	+30	7.0

Note: /1 Irrigation benefit will attain its maximum at 7th year after completion of the project

/2 US$270 = 1 ton of Rice

/3 Proposed construction cost of US$138 million

Annex I Estimate of Negative Benefit

The economic cost for the cultivated land to be inundated or to be acquired for the implementation of the Wonogiri Multipurpose Dam Project is evaluated in terms of negative benefit. The negative benefit is defined as the loss of agricultural net income which is expected to accrue from the land to be submerged or to be acquired.

In order to estimate the negative benefit, land use and cropping areas are estimated for each area. Applying the same method as the estimation of irrigation benefit, negative benefit is calculated as follows.

Land Use (Ha)

	Irrigated Sawah	Rainfed Sawah	Tegal	Total
Wonogiri Dam & Reservoir	2,200	2,139	2,783	7,122
Irrigation	629	375	20	1,024
River Improvement	-	282	-	282
Total	2,829	2,796	2,803	8,428

Cropping Area (Ha)

	Wonogiri Dam & Res.	Irrigation	River Improvement	Total
Wet/s Paddy	2,910	810	140	3,860
Dry/s Paddy	730	265	20	1,015
Upland Paddy	570	-	-	570
Maize	2,420	240	-	2,660
Cassava	2,850	275	110	3,235
Peanut	430	50	20	500
Soybean	990	100	30	1,120
Total	10,900	1,740	320	12,960

Productivity of Farm Crop Production

(Future Without - Project)

	Wonogiri Dam & Res. (t/Ha)	Irrigation (t/Ha)	River Improvement (t/Ha)
Wet/s Paddy			
Irrigated	2.5	4.0	-
Rainfed		2.8	-
Inundated	-	-	2.0
Dry/s Paddy			
Irrigated	1.8	3.7	-
Rainfed		2.2	2.2
Upland Paddy	0.7	-	-
Maize	0.3	0.5	0.5
Cassava	2.0	3.3	3.3
Peanut	0.3	0.5	0.5
Soybean	0.2	0.4	0.4

Net Income per Ha

Net income from each crop per ha is calculated for three areas on the basis of the estimated productivity and production costs as presented below.

i) Wonogiri Dam & Reservoir Area

	Production (t/ha)	Price (10^3Rp/t)	Gross Income (10^3Rp)	Farm Exp. (10^3Rp/ha)	Net Income (10^3Rp/ha)
Wet/s Paddy	2.5	59	147.5	52	95.5
Dry/s Paddy	1.8	59	106.2	47	59.2
Upland Paddy	0.7	59	41.3	36	5.3
Maize	0.3	28	8.4	8	0.4
Cassava	2.0	13	26	17	9
Peanut	0.3	95	28.5	26	2.5
Soybean	0.2	69	13.8	11	2.8

ii) Irrigation Area

	Production (t/ha)	Price (10^3Rp/t)	Gross Income (10^3Rp)	Farm Exp. (10^3Rp/ha)	Net Income (10^3Rp)
Wet/s Paddy					
Irrigated	4.0	59	236	96	140
Rainfed	2.8	59	165.2	73	92.2
Dry/s Paddy					
Irrigated	3.7	59	218.3	96	122.3
Rainfed	2.2	59	129.8	67	62.8
Maize	0.5	28	14	11	3
Cassava	3.3	13	42.9	19	23.9
Peanut	0.5	95	47.5	29	18.5
Soybean	0.4	69	27.6	16	11.6

iii) River Improvement Area

	Production (t/ha)	Price (10^3Rp/t)	Gross Income (10^3Rp)	Farm Exp. (10^3Rp/ha)	Net Income (10^3Rp)
Wet/s Paddy	2.0	59	118	69	49
Dry/s Paddy	2.2	59	129.8	67	62.8
Cassava	3.3	13	42.9	19	23.9
Peanut	0.5	95	47.5	29	18.5
Soybean	0.4	69	27.6	16	11.6

Negative Benefit

On the basis of the net income per ha and estimated cropping area, negative benefit is calculated at US$1.21 million in the following manner.

i) Wonogiri Dam & Reservoir

	Cropping Area (ha)	Net Income (10^3Rp/ha)	Negative Benefit (10^3Rp)
Wet/s Paddy	2,910	95.5	277,905
Dry/s Paddy	730	59.2	43,216
Upland Paddy	570	5.3	3,021
Maize	2,420	0.4	968
Cassava	2,850	9	25,650
Peanut	430	2.5	1,075
Soybean	990	2.8	2,772
Total	10,900		354,607

ii) Irrigation Area

	Cropping Area (ha)	Net Income (10^3Rp/ha)	Negative Benefit (10^3Rp)
Wet/s Paddy			
Irrigated	570	140	79,800
Rainfed	181	92.2	16,688.2
Dry/s Paddy			
Irrigated	230	122.3	28,129
Rainfed	15	62.8	942
Maize	240	3	720
Cassava	275	23.9	6,572.5
Peanut	50	18.5	925
Soybean	100	11.6	1,160
Total	1,740		134,936.7

iii) River Improvement Area

	Cropping Area (ha)	Net Income (10^3Rp/ha)	Negative Benefit (10^3Rp)
Wet/s Paddy	140	49	6,860
Dry/s Paddy	20	62.8	1,256
Cassava	110	23.9	2,629
Peanut	20	18.5	370
Soybean	30	11.6	348
Total	320		11,463

Total Negative Benefit Rp. 501,006,700
(US$1,210,000)

2. FINANCIAL EVALUATION

2.1 GENERAL

Financial evaluation of the project is made by the analysis of the typical farm budgets and the assessment for repayment of the project construction cost.

Farm budget analysis is conducted to assess whether the project will have sufficient incentive to the farmers in the project area and will bring enough income increase in the farmer's economy. Assessment of the water charge to be introduced in the irrigated area is also made briefly.

In succession, construction fund requirement is estimated for the implementation of the project, taking into account the cost escalation to be expected during the construction period. Repayment analysis is made on the basis of the expected direct revenue and the estimated fund requirement with the assumed terms of the finance.

2.2 FARM BUDGET ANALYSIS

2.2.1 Farm Budget

In order to evaluate the feasibility of the project from farmers' economy, farm budget is investigated by the farm survey for future without-project and future with-project conditions.

Under future without-project condition, two different farm budgets are calculated which represent those of the irrigated area and rainfed area, and one typical farm budget is estimated under future with-project condition.

For estimating these farm budgets, it is assumed that the average cultivation area of 0.52 ha per farmer at present will remain unchanged even if the irrigation project is completed. The results of the calculation are presented in Tables III-10 to III-12.

Upon completion of the project, farm income gained from selling crops is expected to increase considerably. In the irrigated area, the expected increase in farm income is about 2.2 times, while about 3.1 times in the rainfed area. Since intensive land use is introduced as a result of the project, more family labour will be utilized on farm and non-farm income is expected to decrease on future-with project condition.

With respect to expenses, farming expenses are anticipated to increase considerably in proportion to the increase of farm inputs. Living expenses are also expected to increase for the improvement of living standard. The resulting net income, which is defined as the difference between farm income and farm expenses will reach the level of Rp.217,400 (US$523). Given the family size of 4.9, per-capita income will be US$107, which indicates substantial increase compared with that of US$44 and US$32 for the irrigated area and rainfed area on without-project condition, respectively.

Annual net reserve or capacity to pay will also grow from about Rp.3,000 (irrigated area) and Rp.250 (rainfed area) to Rp.111,700. The increased net reserve shows sufficient capacity to pay for some charge on the irrigation water in the future.

2.2.2 Water Charge

Traditionally, farmers in Indonesia have not paid directly for capital costs of irrigation systems but have contributed indirectly through the land tax. At present, farmers pay land tax of about Rp.4,000 per ha on the irrigated land, while about Rp.2,500 to Rp.3,000 per ha on the non-irrigated area.

Recently, water charge is introduced to cover operation and maintenance costs of the irrigation system and some parts of the construction costs for the project financed by international organizations.

Although there is no provision concerning the water charge for the Wonogiri Irrigation on the part of the Government, water charge is tentatively assessed on the basis of the estimated farm budget and its feasibility is briefly evaluated in this section.

Water charge to be imposed on the beneficiaries should be within the reasonable range that can still give to the farmers sufficient incentives for agricultural production increase in the project area. It is, therefore, considered that 10 - 15 % of the increased net reserve would be the expected water charge, at the maximum. Under this principle, the probable water charge is calculated at about Rp.20,000/ha/1 - Rp.30,000/ha per year.

From the estimated annual operation and maintenance costs of US$340,000 (Rp.141.1 million) for the irrigation systems, it is calculated that the annual cost per ha is only Rp.6,100. This figure indicates that the expected water charge can cover not only the operation and maintenance costs, but also a part of its capital cost.

/1 Increased Net Reserve = Rp.111,720 - Rp.3,009
= Rp.108,711 (per 0.52 ha)
Expected Water Charge per ha = (Rp.108,711/0.52) x 0.1
≒ Rp.20,000/ha

On the other hand, the expected water charge of Rp.20,000/ha/1 - Rp.30,000/ha corresponds to dry stalk paddy of 440 kg/ha - 660 kg/ha per year or about 180 kg/ha - 260 kg/ha per one crop season. The expected water charge is still in the reasonable range compared with the current water charge of 200 kg/ha per one crop season imposed on the beneficiaries of the Tadjum Irrigation Project/2. This fact suggests that the expected water charge seems quite realistic and plausible.

/1 Rp.20,000/Rp.45 ÷ 440 kg

/2 The Tadjum Irrigation Project was constructed in 1973 covering about 3,200 ha of irrigable area by ADB finance. The project is located in Central Java.

Table III-10 Typical Farm Budget with Paddy Field of 0.52 Ha (Irrigated Area, Future without Project)

	Area (ha)	Unit yield (t/ha)	Total yield (t)	Unit price (Rp/kg)	Total value (Rp)
I. Gross Income					
1. Farm income					
Wet/s paddy	0.52	4.0	2.08	45	93,600
Dry/s paddy	0.22	3.7	0.81	45	36,450
Polowijo	0.18	-	-	-	10,910
Livestock	-	-	-	-	8,100
Sub-total	-	-	-	-	149,060
2. Non-farm income					
Wage income & trade					6,710
Others					15,650
Sub-total					22,360
Total Gross Income					171,420

	Area (ha)	Unit amount (kg/ha)	Total amount (kg)	Unit price (Rp/kg)	Total cost (Rp)
II. Gross Outgo					
1. Farming Expenses					
(Paddy)					
Seed	0.74	30	22.2	125	2,775
Fertilizer	0.74	270	199.8	80	15,984
Chemicals	0.74	2ℓ	1.48	900	1,332
Labor cost					26,760
(Polowijo)					
Seed	0.18				1,510
Labor cost					900
Land tax	0.52 Ha				2,080
Interest on investment					4,770
Livestock					2,670
Sub-total					58,781
2. Living Expenses					
Food consumption					65,780
Other living expenses					43,850
Sub-total					109,630
Total Outgo					168,411
III. Net Reserve (or capacity to pay)					3,009

Table III-11 Typical Farm Budget with Paddy Field of 0.52 Ha (Rainfed Area, Future without Project)

	Area (ha)	Unit yield (t/ha)	Total yield (t)	Unit price (Rp/kg)	Total value (Rp)
I. Gross Income					
1. Farm income					
Wet/s paddy	0.52	2.8	1.46	45	65,700
Polowijo	0.44				26,660
Livestock					14,090
Sub-total					106,450
2. Non-farm Income					
Wage income & trade					7,980
Others					18,630
Sub-total					26,610
Total Gross Income					133,060

	Area (ha)	Unit amount (kg/ha)	Total amount (kg)	Unit price (Rp/kg)	Total cost (Rp)
II. Gross Outgo					
1. Farming Expenses					
(Paddy)					
Seed	0.52	35	18.2	125	2,275
Fertilizer	0.52	180	93.6	80	7,488
Chemicals	0.52	1 ℓ	0.52 ℓ	900	468
Labor cost	0.52				14,630
(Polowijo)					
Seed	0.44				3,690
Labor cost	0.44				2,520
Land tax	0.52				1,560
Interest on investiment					3,860
Livestock					4,230
Sub-total					40,721
2. Living Expenses					
Food consumption					59,200
Other living expenses					32,890
Sub-total					92,090
Total Outgo					132,811
III. Net Reserve (or capacity to pay)					249

Table III-12 Typical Farm Budget with Paddy Field of 0.52 Ha (With Project)

	Area (ha)	Unit yield (t/ha)	Total yield (t)	Unit price (Rp/kg)	Total value (Rp)
I. Gross Income					
1. Farm Income					
Wet/s paddy	0.52	5.5	2.86	45	128,700
Dry/s paddy	0.52	5.5	2.86	45	128,700
Paddy(1/2)	0.26	5.5	1.43	45	64,350
Livestock					12,560
Sub-total					334,310
2. Non-farm Income					
Trade & others					21,290
Total Gross Income					355,600

	Area (ha)	Unit amount (kg/ha)	Total amount (kg)	Unit price (Rp/kg)	Total cost (Rp)
II. Gross Outgo					
1. Farming Expenses					
(Paddy)					
Seed	1.3	25	32.5	125	4,062
Fertilizer (Urea TSP)	1.3	350	455	80	36,400
Chemicals					
- Insecticide	1.3	4	5.2	900	4,680
- Rodenticide	1.3	0.2	0.26	2.30	598
Labor cost	1.3				52,920
Land tax					2,600
Interest on investment					11,920
Livestock					3,770
Sub-total					116,950
2. Living Expenses					
Food consumption					76,160
Other living expenses					50,770
Sub-total					126,930
Total Outgo					243,880
III. Net Reserve (or capacity to pay)					111,720