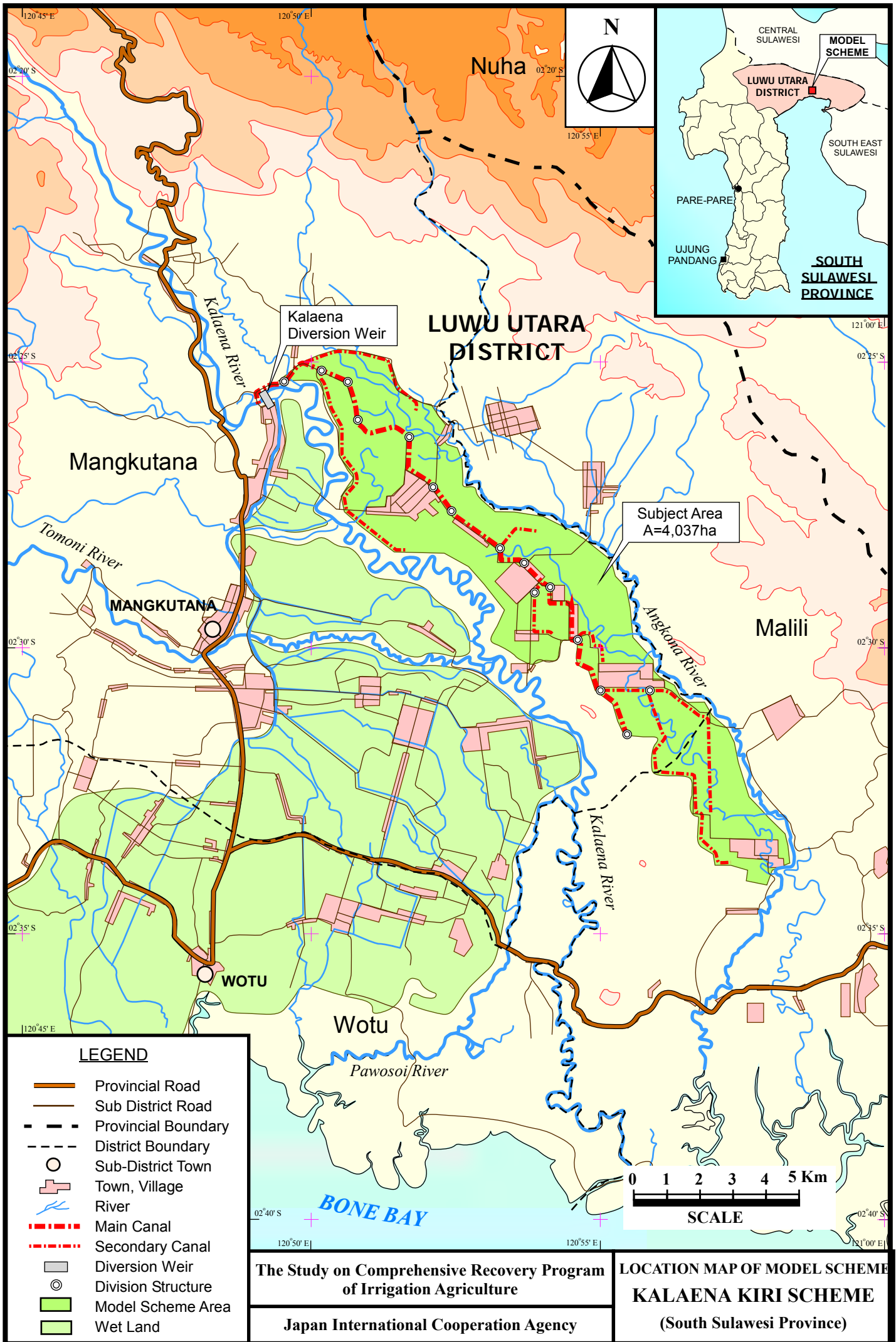


PART II

***FEASIBILITY STUDY FOR
SELECTED MODEL SCHEME***



LEGEND

- Provincial Road
- Sub District Road
- Provincial Boundary
- District Boundary
- Sub-District Town
- Town, Village
- River
- Main Canal
- Secondary Canal
- Diversion Weir
- Division Structure
- Model Scheme Area
- Wet Land

The Study on Comprehensive Recovery Program of Irrigation Agriculture

Japan International Cooperation Agency

LOCATION MAP OF MODEL SCHEME

KALAENA KIRI SCHEME

(South Sulawesi Province)

CHAPTER 1 PRESENT CONDITION

1.1 Natural Conditions

(1) Location

The project area, the Kalaena Kiri Scheme, lies in Luwu Timur district of South Sulawesi province. Major cities situated near the project area are Woto and Maleku.

The Kalaena river (total length: approx. 150 km) is the water resource for the irrigation of the project area, of which the catchment area at the intake site is approx. 1,070 km². An intake weir is provided about 15 km upstream in the estuary of the Kalaena to irrigate both banks of the river. The registered area of the Kalaena Kiri Scheme extending to the left bank is 4,552 ha, whereas that of Karaena Kanan Scheme extending to the right bank is 14,422 ha. The intake structure site is approx. El. 40 meters above mean sea level, and that of the lowland area of the scheme is approx. El. 10 meters.

(2) Meteorology and Hydrology

A meteorology station is available at Masamba City, about 60 km west ward from the project area. The project area ranges between the south latitude 2° south to 3° south, and lies in the typical monsoon zone. The annual rainfall is about 3,700 mm, and it is concentrated from December to July, however, it is difficult to distinguish between the wet season and the dry season. The annual average temperature is about 26.8°C, with very little seasonal variation throughout the year. The monthly average temperature varies from a maximum of 27.3°C in October to a minimum of 25.8°C in August.

The annual river runoff of the Kalaena River is approx. 70 m³/s, and the peak river runoff is observed in January to March every year, whereas the runoff in the dry season ranges between 47 m³/s and 50 m³/s. No large scale intake of water in the upstream of the existing intake structure has been provided for irrigation. The meteorology and hydrology records are shown in Table B-1.1.1.

1.2 Socio-economy

Administratively the Scheme is located in Mangkutana and Angkona Sub-district (the project sub-districts) of Luwu Timur District, which was established in June 2003 separating from Luwu Utara District. The beneficiary area of the Scheme extends in seven villages (the project *desas*: 5 *desas* of Mangkutana & 2 *desas* of

Angkona). The administrative area of the project sub-districts is 1,490 km² and the same of the project *desas* is 415 km².

The population of the project sub-districts was 42,143 and the same in the project *desas* was 13,896 in 2001. The number of households and the average family size in the sub-districts are 10,703 and 3.9 persons, respectively. The same in the *desas* are respectively 3,632 and 3.8. The rural population of the sub-district accounts for 90% of the total.

The project *desas* are mostly of government transmigration villages established during 1976 to 1982 and there are five Transmigration Units in the Scheme. Originally 500 families were settled in each Unit. Transmigrates mostly originated from other islands including Java, Bali and Lombok. There are some local spontaneous transmigrants from South Sulawesi settled in the Scheme as well.

Major socio-economic features of the sub-districts and *desas* are presented in the following table.

Socio-economic Features of Project Sub-district & Desas

Indicators	Project Sub-district	Project <i>Desas</i>
Area (km ²)	1,490	415
No. of <i>Desas</i>	21	7
Population	42,143	13,896
No. of Households	10,703	3,632
Average Family Size	3.9	3.8
Origin of Residents	Transmigrates/Local	Transmigrates (mostly)/Local
Labor Forces per Family	Luwu Utara District 2.8 per family	

Source: Kabupaten Luwu Utara Dalam Angka & Kecamatan Dalam Angka, 2001.

The agriculture sector is the main economic activity both in the sub-districts and *desas*. The main sub-sectors in both are food crops production and estate crops production. The main food crop is paddy and the main estate crop is cacao. Cacao production is carried out by small holders. Other agricultural activities in the area include the livestock sub-sector, though its scale is limited to the said two sub-sectors.

1.3 Present Conditions of the Project

(1) General Situation

According to the Design Report prepared for the Irrigation Network in 1997, the general features of the irrigation and drainage facilities of the Kalaena Kiri Scheme are as follows.

General Features of Irrigation and Drainage Facilities prepared in 1997

Headworks	1 no. (headworks with fixed weir, length of the weir: 104 m, construction: 1980)
Design intake discharge	8.5 m ³ /s for Kalaena Kiri scheme
Irrigation canals	Main canal: 19 km, Secondary canal: 9 nos.; 20km
Drainage canals	Main drainage canal: 10 km, Others: 8.5 km
Structures	42 nos. in irrigation canals, 8 nos. in drainage canals

Irrigation development projects for the Kalaena Kanan and Kalaena Kiri Schemes had commenced in 1980. Higher priority was given to the Kalaena Kanan Scheme as the beneficiary area was expected to be as large as 14,000 ha. Implementation of the Kalaena Kiri project was commenced in 1990. However, construction was concentrated only on the main and secondary canals and the major related structures of the main canal. Due to the “vicious circle” of poor O&M caused by insufficient budget and collapse of irrigation canal at the upper reaches, blocking of irrigation water by soils and sedimentations, the irrigated area even in the wet season became as small as 60% of the entire beneficiary area at maximum. Because only less than 10 years have passed since the completion of the project, no large-scale rehabilitation has been conducted since then. As a result of an absolute shortage of water, some farmers in the project area are reluctant to cultivate rice, and they are converting the paddy field into cacao field. (the Polo secondary irrigation canal area) In addition, the secondary canals have been covered with grass, trees, etc., due to poor maintenance and no irrigation water supply for a long time.

(2) Investigation of the Existing Facilities

Field investigation of the existing irrigation facilities was carried out by the JICA Study Team during September and October 2003 in order to formulate the rehabilitation plan. The facilities subject to investigation are as follows (Investigation results will be detailed in Section 3.2.):

Headworks: 1 no.

Main canal: 1 no. (total length: 19 km) and related structures

Secondary canals: 4 nos. (total length: 10 km) and related structures

The general layout of existing condition is shown in Figure B-1.3.1.

(3) Present Conditions and Problems

The field investigation of the irrigation facilities has revealed that there exist following problems (See the photos below showing the present conditions of the project area):

- 1) Water flow in the Main Canal is obstructed by the collapse of canal banks and vegetation (weeds and small trees). Especially, unlined

canals from the division structure BK.Ki 7 (Hm 77 +15) to the downstream reach are heavily damaged due to collapse of both banks. Also, seepage and overtopping of water from the canal are observed elsewhere.

- 2) Most of the Secondary Canals are not used at present, and hence O&M are not actually practiced.
- 3) Most of the inspection roads along the Main and Secondary Canals are not utilized due to collapse and damage, especially at the secondary canals. They are almost impassable by a car with four-wheel drive even in the dry season.
- 4) Damage to the gates is not so serious, but maintenance such as greasing and painting is not practiced at all.



1. Headworks



2. Headworks, Scouring Sluice (right) and Intake (left)



3. Division Structure and Canal at 2.4 km point (BK Ki 2)



4. Off-take of Division Structure at 2.4 km point



5. Canal Condition at 9.7 km point
(BK Ki 10)



6. Tertiary Canal at BK Ki 10

Under these circumstances, rehabilitation of irrigation facilities is of great urgency in order to not only protect function of the existing facilities but also to encourage the beneficiaries to grow rice, otherwise they will be obliged to convert rice field to the other crop fields.

(4) Operation and Maintenance System

A water users' association has been established in the tertiary blocks, nonetheless operation and maintenance systems are not active due to the following reasons:

- 1) Decrease of irrigated areas due to reduced function of irrigation facilities, and hence shortage of water.
- 2) Insufficient knowledge of water management and O&M of facilities.

1.4 Agriculture

The basic agricultural features of the Scheme are presented in summarized form in Table B-1.4.1 and discussed in the following sections.

1.4.1 Agro-demography

The agro-demographic features of the project sub-district are estimated based on the information provided by BPP Mangkutana as presented in Table B-1.4.1 and summarized in the following table.

Agro-demographic Features of Project Sub-district in 2002

Agro-demographic Indicators	Mangkutana Sub-district	Project <i>Desas</i> *1
Proportion of Farm Households to Total Households	86 %	80 %
Owner Farmer	2 %	5 %
Owner-cum-tenant Farmer	96 %	90 %
Farm Labor	2 %	5 %

Note *1: Project *desas* in Mangkutana

On the basis of the tables, the number of farm households of the project sub-districts and *desas* in 2002 is estimated at some 9,200 or accounting for 86% of the total households of 10,703 and some 2,910 or accounting for 80 % of the total households of 3,632, respectively.

The current land tenure status in the project sub-districts and *desa* are assumed to be nearly same as the features of Mangkutana Sub-district and the 5 project *desas* of Mangkutana shown in the tables.

The land tenure status in the project *desas* accordingly assumed is owner and owner-cum-tenant farmers 95% and farm laborers 5%. The average holding size of paddy field per beneficiary farm household in the Scheme is roughly estimated at about 1.4 ha based on the paddy field of about 4,000 ha and the number of beneficiary households of about 2,800.

1.4.2 Land Use

The present land use of the Scheme has been estimated on the basis of the information provided by the branch offices of the District PSDA Sub-Services and provided by the village chiefs of the project *desas* as shown in Table B-1.4.1 and summarized below.

Present Land Use of Kalaena Kiri Scheme

Paddy Field: Potential Area for Irrigation				Land Converted to Cacao Field	Original Potential Area for Irrigation
Irrigated Paddy Field	Rainfed Condition *1	Cacao Planted Field	Total		
2,375 ha (59 %)	832 ha (21 %)	830 ha (21 %)	4,037 ha (100 %)	450 ha -	4,487 ha -

Note *1: Paddy field in irrigation command area being under rainfed condition

As shown in the table, 450 ha of the original potential area of the Scheme have been converted to cacao fields with no tertiary development works and the present potential area for irrigation of the Scheme is 4,037 ha. Of the area, 59% or 2,375 ha and 21% or 832 ha are irrigated paddy field and paddy field in the irrigation command area being under rainfed condition, respectively. The paddy fields under rainfed condition are extending extensively in the down-stream areas of the Scheme. In 21% of the paddy fields or 830 ha, cacao trees were recently planted due mainly to suspension of irrigation water supply to the subject fields and to lower productivity of single cropping of paddy in rainfed fields compared with cacao production. Most of the cacao trees in such fields are less than 2 years old and no fruit production has commenced at present.

1.4.3 Cropping Schedule and Pattern

The prevailing cropping schedules and patterns in the Scheme are identified as shown below and in Table B-1.4.1.

Cropping Schedules

- Paddy (planting ~ harvest): Wet Season: Jan. - Feb. ~ Apr. - May
- Dry Season: June - July ~ Sept. - Oct.
- Palawija: Cultivation in paddy field extremely limited

Cropping Pattern

- Irrigated Paddy Field: wet - dry season: paddy - paddy
- Paddy Field under Rainfed Condition: wet - dry season: paddy - fallow

1.4.4 Cropped Area and Cropping Intensity

The irrigation performances in irrigated paddy fields expressed by cropped area and cropping intensity and the cropped area and cropping intensity in paddy fields being under rainfed conditions are similarly estimated based on the information provided by the District PSDA Sub-Services and the information provided by the village chiefs of the project *desas* and the Extension Coordinator (chief of BPP) in the Scheme as shown in Table B-1.4.1 and summarized below.

Cropped Area and Cropping Intensity in Kalaena Kiri Scheme (4,037 ha)

Crops/Items	Irrigated Paddy Field (2,791ha)	Rainfed Paddy Field (1,246ha)	Total (4,037ha)
Wet Season Paddy	2,375 ha	832 ha	3,207 ha
Dry Season Paddy	2,375 ha	-	2,375 ha
Annual Paddy	4,750 ha	832 ha	5,582 ha
Annual Cropping Intensity of Paddy	170 %	67 %	138 %
Cacao	416 ha	414 ha	830 ha
Overall Annual Cropping Intensity	185 %	100 %	159 %

Rainfed Paddy Field: Paddy field in irrigation command area being under rainfed condition

As shown in the tables, the annual cropping intensity of paddy in the irrigated fields used for paddy production is estimated at 200% and the same in the paddy fields under rainfed condition is at 100%. The overall irrigation performance in the paddy fields used for paddy production expressed by cropping intensity of paddy is 138%. The overall cropping intensity including cacao area is estimated at 159%.

1.4.5 Crop Yield and Production

The present yield levels of paddy in the Scheme are estimated on the basis of the findings of the Phase I Study (estimation of irrigated paddy yield), field observation and information provided by the Extension Coordinator in the Scheme and representatives of farmers organizations as follows;

Current Crop Yields in Kalaena Kiri Scheme

Crops	Wet Season	Dry Season
Irrigated Paddy	4.0 t/ha	4.0 t/ha
Rainfed Paddy *1	3.0 t/ha	-

Note *1: Paddy in irrigated fields grown under rainfed conditions

On the bases of the estimated yields and the cropped area, the present annual paddy production in the Scheme is estimated at some 21,500 tons as shown in Table B-1.4.1 and summarized below.

Present Crop Production in Kalaena Kiri Scheme

Crops	Wet Season (ton)	Dry Season (ton)	Annual (ton)
Irrigated Paddy	9,500	9,500	19,000
Rainfed Paddy *1	2,496	-	2,496
Total	11,996	9,500	21,496

Note *1: Paddy in irrigated fields grown under rainfed conditions

1.4.6 Farming Practices and Crop Budget

The current prevailing farming practices of paddy are as shown in Table B-1.4.2 and summarized below.

Variety	Improved variety: Ciliwung & Sintanur (115 days)
Nursery	Seeding rate: 30 kg/ha; period 20 ~ 25 days
Land Preparation	By machinery (hand tractor)
Planting	Manual transplanting (regular); = 20 x 20 cm
Fertilization	NPK applied: volume depending
Harvesting	Manual; threshing by power/pedal thresher

Current crop budgets of major crops (irrigated & rainfed paddy) in the Scheme are studied based on the data collected through the Inventory Survey and crop budget analyses made by the District Agriculture Services Office, Luwu Utara as shown in Table B-1.4.2 and summarized in the following table.

Financial Net Return per ha

Commodity	Yield (t/ha)	Gross Return/ha (Rp.000)	Production Cost (Rp.000)	Net Return/ha (Rp.000)
Irrigated Paddy *1	4.0	5,200	2,030	3,170
Rainfed Paddy	3.0	3,900	1,480	2,420

Note *1: Wet & dry season paddy

1.4.7 Marketing

The prevailing marketing practices of paddy in the Scheme are “selling paddy just after harvest at the field” followed by “selling rice after milling”. The prevailing marketing channel of paddy is “selling paddy to collector/middleman” followed by “selling paddy to KUD”.

1.4.8 Farm Economy

The primary objective of the farm economic analysis under the present Study is to examine capacity-to-pay or possible contribution of O&M costs by beneficiary farmers after the project. Further, the limited accessibility to reliable farm household incomes and expenditures prevent examining farm economic conditions. Accordingly, the present farm economic analysis has been made on 1 ha of irrigated paddy field or rainfed paddy field by estimating net farm income from the field. The results of the farm economic analyses thus made are presented as follows:

Estimated Net Farm Income from 1ha of Paddy Field

Land Use Category	Net Farm Income (Rp.000)	Cropping Pattern Assumed
Irrigated Paddy Field	6,340	Double cropping of paddy (1 ha)
Rainfed Paddy Field	2,420	Single cropping of paddy (1 ha)

1.4.9 Agricultural Support Institutions, Farmer Organizations and Extension

(1) Agricultural Support Institutions and Farmer Organizations

The main government agricultural support institutions providing technical and institutional support in and around the Scheme include two Rural Extension Services Centers (BPPs), District Agriculture Services Office (to be established), Agricultural Extension Information Center (BIPP; to be established) and two seed farms as shown in Table B-1.4.1. The District Agriculture Services Office, Luwu Timur is yet to be established. The planned organization of the Office has 4 sub-services of food crops, livestock, fisheries and food security and BIPP will be formed independently.

The district institutions are placed under the jurisdiction of the district governor, although the technical guidance and support linkages with the central and provincial agencies are still maintained. BPPs and Field Extension Workers (PPLs) will be placed under the BIPP.

A number of farmers' organizations involved in agricultural activities have been formed in the project sub-districts and *desas*. Among the same, the major ones are the Farmers' Group (*Kelompok Tani/KT*) and Water Users' Association (P3A). The number of KTs formed in the project sub-districts and *desas* and their development status assessed by district agricultural agencies are shown in Table B-1.4.1. In the project 5 *desas* in Mangkutana sub-district, 22 KTs with a total membership of about 623 have been formed. Of 22 KT, 50% are classified as

primary level (*pemula*), 45% as secondary level (*lanjut*) and 5% as middle level (*madya*).

There are 4 KUDs and 10 KOPTANs in the project sub-district, though no UPJA has been formed and no BRI Village Unit is operated in the project sub-district. General problems encountered by KUD are reported to be: i) cooperative funds still limited, ii) management capability still poor and iii) awareness of members on cooperative activities, member's rights & responsibilities and cooperative principle still limited.

(2) Agricultural Extension

One of the main features of the decentralization policy in the agriculture sector is the devolution of agricultural extension activities to the district government. Therefore, the functions of the provincial extension agencies have faded away and their current main functions are to provide technical guidance and support to district agencies. The arrangements for institutions for the agricultural extension services are not uniform among districts.

The extension services to farmers in Indonesia are basically provided by PPLs of district agricultural agencies, who are to guide and serve farmers through farmers' groups in their working area. PPLs are deployed by sub-district basis to BPPs.

The number of PPLs assigned to BPP in the project sub-district is 13 and out of them 5 are deployed in and around the Scheme. However, the activities of PPLs are rather limited due to limitations of transportation, extension materials & equipment and operation funds. Extension programs scheduled in and around the Scheme in 2003 include the Intensification Quality Improvement Project (PMI; 100 ha) and demonstration of organic fertilization.

The weaknesses or problems involved in the current extension services are:

- Limitation of funds for implementation of extension activities, insufficient number of extension staff and; capabilities of extension staffs especially on post-harvest and marketing issues still limited, and
- Coordination & collaboration of extension agencies and agriculture service offices yet to be established to introduce holistic approaches for extension.

1.4.10 Agricultural Facilities and Machinery

The numbers of agricultural facilities and machinery including rice mills, tractor, thresher, paddy dryer etc. possessed in the project sub-districts and *desas* are shown in Table B-1.4.1. The availability of hand tractors in the project *desas* will be in shortage when land preparation works of all the paddy fields in the Scheme

are to be carried out by machinery according to the prescribed cropping schedule of the Irrigation Committee, which may result in prolonged planting season of paddy in the area. The capacity of rice mills in and around the Scheme is sufficient to meet milling requirements in the areas as such requirement is mostly for family consumption and most of the paddy is marketed without husking.

1.4.11 Agricultural Development Constraints

The major agricultural development constraints identified in the Scheme include:

- Shortage of irrigation water supply in the dry season,
- Poor land drainability, especially in paddy fields under rainfed condition extended in the down-stream part of the Scheme,
- Land use conversion to cacao due to suspension of irrigation water supply,
- Insufficient extension services; insufficient capability of extension staff especially in post-harvest & marketing aspects, lack of facilities and equipment (BPP), limitation of operation funds & transportation and limited coverage of extension services and activities of PPLs,
- Limited activities of KTs and other farmers' organizations,
- Shortage of hand tractors resulting a in prolonged paddy planting season,
- Low market prices of paddy, and
- Low product quality of paddy due to high moisture content and poor function of rice mills.

1.5 Institution

(1) District Government Authorities

The Luwu Utara District Government under the control of the Regent (*Bupati*) is composed of two secretariats, 17 internal units, 16 external units and 25 branches, having 5,048 civil servants as a whole. These civil servants consist of 171 first rank officers, 171 second rank, 1,520 third rank, 3,356 fourth rank officers and rank-and-file staffs.

Actual receipts of the Luwu Utara District Government in 2000, when the it was separated from the former Luwu District, were Rp.63 million mostly granted by the Provincial Government. On the other hand, actual expenditures in 2000 amounted to Rp.56 million as shown in Table B-1.5.1. Out of these expenditures, Rp.19 million was allocated to development expenditures and only Rp.0.1 million was distributed to water resources and the irrigation sector.

(2) District Water Resources Services Office

In Luwu Utara District, public administration of water resources and irrigation management aspects is the responsibility of the District Settlement and Rural Infrastructure Services through its Water Resources Management Sub Services. As illustrated in Figure B-1.5.1, four sections are established with 29 staff under these Sub Services to manage irrigation schemes located in Luwu Utara District. This Sub-Services unit is responsible for 13 public irrigation schemes including the Karaena Kiri irrigation scheme. Among 13 irrigation schemes, there are six technical irrigation schemes commanding 22,710 ha and one semi-technical irrigation scheme covering 995 ha. Budget allocate to water resources and irrigation management in 2003 amounted to Rp.3,248 million including Rp.1,803 million from APBD District.

Similar to other districts/municipalities in South Sulawesi, planning mechanism of water resources sector consists of two channels. One is top-down development planning framework from national and provincial to district level, while the other is bottom-up planning framework from village to district through sub-district. In concrete, *Bupati* is responsible for reviewing any proposal from village/water users by referring to national, provincial and river basin water resources development and management policy frameworks. Prior to implementation, *Bupati* should also ask for consultation of provincial agencies concerned and also feed back their recommendations to its proposed plan.

(3) Water Users' Association

It has been reported that the WUA establishment target in the scheme is 49 and its achievement is 29. According to the latest monitoring and evaluation record made by the District Water Resources Management Sub Services office, 27 WUA are classified as "Under development and the remaining two WUA as "Not yet developed".

Through the inventory under this F/S, it has been confirmed that there are 33 tertiary blocks directly commanded by the main canal and 48 tertiary blocks covered by 14 sub/secondary canals. Out of these tertiary blocks, WUA has been established in 30 tertiary blocks of which 22 are directly served by the main canal and 8 are commanded by 5 sub/secondary canals as listed up in Table B-1.5.2. Therefore, another 51 WUA have to be established. In 9 tertiary blocks commanded by Polo secondary canal, farmers have planted oil palm. Along the most downstream secondary canals, Bedo and Sarikko, only one WUA exists within 15 tertiary blocks.

Through face-to-face interview surveys with 110 WUA member farmers in 13 tertiary blocks and 28 non-member farmers based on the rapid rural appraisal method, it is confirmed that 1,205 farmers in total are the existing members of 30 WUA at present. The followings are major items confirmed and pointed out by face-to-face interview respondents of 110 WUA member farmers:

- In 13 WUA interviewed, board of directors is active in accordance with its article and its member farmers are sure to attend its annual meeting;
- In 12 WUA where irrigation water is provided, cropping pattern, crop planting schedule and water allocation plan are prepared and practiced every crop season. While, in 1 WUA without irrigation water supply as located in the most downstream part of the scheme, no crop planting and water allocation plans are available;
- In the above 12 WUA, maintenance program of irrigation facility is prepared and practiced where facilities function. Coordination meeting with waterman of Luwu Utara District Settlement and Rural Infrastructure Services is regularly maintained. In the WUA located in the downstream area, irrigation facility has been damaged but no rehabilitation plan has been prepared yet;
- Among 110 respondent members, only 2 farmers who are member of board of directors have paid Rp. 150,000/ha as seasonal contribution to WUA. But the remaining 108 respondents have not paid membership fee or irrigation water charge in cash or in kind. The reason is that contribution and compulsory maintenance work are considered to offset each other; and
- Beneficiary farmers are transmigrants from different locations in Java, Bali, Lombok and Sulawesi so that their behavior toward and awareness of operation and maintenance of tertiary system also reflect to their own customs and way of thinking. It is therefore considerably difficult to practice on-farm level irrigation water management activities in a uniform manner.

Focal points of responses from 28 non-member farmers of WUA as follows:

- All respondents are forced to grow paddy under rainfed condition and looking forward to receiving irrigation water to their paddy field as they have good experience of irrigated farming before they transmigrated to the scheme;
- They know purpose and function of WUA as well as member's duties, especially obligation for operation and maintenance of tertiary system;
- Farmers who have planted cocoa on their paddy field prefer paddy

- cultivation because cocoa productivity is below their expectation; and
- They intend to participate in WUA when it is established.

CHAPTER 2 BASIC CONDITIONS IN FORMULATING REHABILITATION PLAN

2.1 Irrigation

2.1.1 Rehabilitation Plan for Irrigation Facilities

(1) Purposes of Rehabilitation

The rehabilitation plan will be based on the field investigation results and the discussions with the officials of the provincial government concerned and the project management office as follows:

- 1) To maximize utilization of the potential of water and land so as to increase cropping intensity (throughout the year) and crop productivity.
- 2) To utilize existing facilities to the utmost extent in due consideration of the factors of durability.
- 3) To design diversion/turnout structures by providing water measurement devices in order to introduce an appropriate water management technology.
- 4) To provide infrastructures with inspection roads and farm roads for O/M of irrigation facilities and future mechanized farming.
- 5) To provide project facilities such as site operation houses (50m²/house), vehicles, motor cycles, and office equipment for the project office.

(2) Applied Criteria for the Facilities Design

Design of facilities to be rehabilitated is based on the “Irrigation Design Standards” (from KP-01 to 13) prepared by the Ministry of Settlement and Regional Infrastructure (former Ministry of Public Works) in December 1986. In evaluating rehabilitation of irrigation facilities, the “Technical Guideline for Rehabilitation and Upgrading, Irrigation Network” prepared in August 1999 is basically applied.

2.1.2 Assessment of Inventory Survey Result

(1) Number of facilities

According to inventory survey results, there is 1 headworks, 10 irrigation canals consisting of 1 main canal and 9 secondary canals with a total of 40 km in total. The related structures on the irrigation canals are 50 in total, consisting of 33 on the main canals and 17 on the secondary canals. The inspection roads are provided along the whole length of the canals, however, conditions of the roads along both the main and secondary canals are found to be in almost un-trafficable condition.

Features of Irrigation Facilities

Facility	Number	Length (km)	No of Structure
Headworks	1	w=104 m (fixed type weir)	Right & left intakes
Main Canal	1	18.989	33
Secondary Canal	9	19.891	17

The main canal is lined with masonry for about 7.7 km from the headworks and the remaining 11.3 km is unlined canal with a trapezoidal section. The structures on the irrigation canals consist of 19 diversion structures, 3 drops made of stone masonry, and bridges, a siphon and a drainage culvert made of reinforced concrete.

(2) Structural condition of the facilities

The structural condition of the facilities was investigated and assessed based on the following classification:

- A: Functioning well, no rehabilitation is needed.
- B: Partially damaged/deteriorated, minor rehabilitation is needed.
- C: Not functioning well, large-scale rehabilitation is needed.
- D: Seriously damaged, replacement or reconstruction is needed.

The structural conditions of the main canals are shown in Table B-2.1.1 to B-2.1.3, and summarized as follows:

Condition of Facilities

Facility	Condition				Total
	A	B	C	D	
Canal (km)	3.80	1.95	1.97	11.27	18.99
Structure (nos.)	1	11	21	0	33

(3) Defects and damages observed

The defects and/or damages observed through the inventory on the above facilities are summarized as follows:

Facilities	Defects/damage
Headworks	<ul style="list-style-type: none"> * Sedimentation in front of the intake * Damage of the stilling basin * Protection blocks washed away * No provision of settling basin near the weir * Damage/rust/deterioration of the steel gates of scouring sluices and intake gates
Irrigation Canal	<ul style="list-style-type: none"> * Poor drainage condition at the excavated section * Sedimentation in the canal * Collapse of side slopes in both the lined and unlined portions * Blocked with trees and water plants inside of canal

Related structure	<ul style="list-style-type: none"> * Reduced function of gates due to rust/deterioration * Reduced function of measuring devices * No provision of safety facilities at siphon and aqueduct * Clogging/sedimentation inside of the drainage culvert * No provision of kilometer and hectometer posts * Low density of canal crossing structure
Inspection Road	<ul style="list-style-type: none"> * Poor maintenance in the whole length * No provision of surface pavement (asphalt or gravel) * Poor related facilities (drainage ditches, safety facilities, etc.)
On-farm Terminal Facilities	<ul style="list-style-type: none"> * Low density of roads and canals * Low density of terminal facilities * Poor access to farms (for farm machinery)

(4) Irrigation and Drainage condition

The land in the irrigation area of the Polo secondary canal has been used for cultivating cacao trees since the completion of the project. Hence, no water supply is made to the said secondary canal. A discussion between Dinas PSDA and the farmers took place and no paddy would be considered in the future even if the rehabilitation work of this scheme were completed. Therefore, the land with an area of 450 ha for the Polo System will be excluded from the development area.

On the other hand, the scheme is surrounded by 2 major rivers; the Kalaena river at the right and the Angkona river at the left. However, no serious drainage problem has been found, because flood dikes surrounding the scheme have been constructed in order to protect the scheme from floods.

(5) Maximum Irrigable Area

Based on the irrigation map prepared by the Balai, discussion was undertaken between the Dinas PSDA and the Balai in order to determine the maximum irrigation area. As a result, 4,037 ha will be irrigated if the water resource availability is sufficient. (It was verified that the land with an area of 4,037 ha will be irrigated through the water balance study made in Chapter 3. And hence, the subject area is fixed at 4,037 ha.)

2.2 Agriculture

The basic concepts applied for the formulation of the agricultural plan under the present Study are as enumerated below.

- 1) The formulation of agricultural plans by placing emphasis on paddy production envisaging contribution to food security in Indonesia and setting a double cropping of paddy as a basic cropping pattern, to which the general consensus of the representatives of beneficiaries of the Scheme have been

obtained at the public consultation meeting of preliminary nature held during the Phase II Study; except for the beneficiaries in the area (command area of Polo Secondary Canal, 450 ha) where cacao trees at fruit bearing stage are planted; the secondary canal was closed for a long period to protect cacao trees from wet injury and no tertiary development was carried out,

- 2) Re-conversion of cacao planted fields to irrigated paddy fields is planned based on the general consensus for the re-conversion attained (on the condition that irrigation water supply for double cropping of paddy is ensured) by the representatives of all beneficiary *desas* except for the command area of the Polo Secondary Canal at the said public consultation meeting,
- 3) The irrigation agriculture performances and experiences in the advanced schemes in South Sulawesi Province are to be fully taken into consideration in the formulation of agriculture plan,
- 4) The current agricultural status including crop selection, cropping schedule, cropping pattern and cropping intensity in the target schemes should duly be assessed and taken into planning so that the formulated plans will be sustainable for beneficiaries intentions and capabilities,
- 5) The rational utilization of irrigation water resources is to be emphasized. In this regard, the increase of cropping intensity with the available water in the 3rd cropping season (cropping season following or between the double crops of paddy) is to be achieved to the greatest possible extent; to which the consensus of beneficiaries should be sought at the further project stage, and
- 6) Major constraints for the attainment of the agriculture development targets are to be duly addressed to the greatest possible extent in the agricultural extension services strengthening. To this effect, strengthening of Farmers' Groups (KTs) should be emphasized aiming at the promotion of agri-business oriented farming activities in the Scheme.

2.3 Institution Strengthening Concept

As the current situation of WUA's performance in the scheme can be described as a mixed status of "WUA already established but not developed yet" and "WUA not established yet". The main reason is the present function of the irrigation system under which sustainable irrigation water supply can be guaranteed to a part of the beneficiary area resulting in limited fulfillment of farmers' water requirements. Therefore, full recovery of the irrigation system's function is a precondition to encourage farmers to accelerate establishment of WUA and participate in WUA to be newly established. Paying special attention to familiarity with irrigated farming practices and awareness of WUA member's

duty of farmers in non-WUA tertiary blocks of the scheme, promotion to accelerate WUA establishment is to be started when implementation of rehabilitation works is decided. Farmers presently planting cocoa on their paddy field intend to switch cocoa to paddy if irrigation water supply is surely guaranteed after function of irrigation scheme is fully recovered.

Another concept for institutional strengthening is to enable irrigation officials in Luwu Utara District to understand and practice the new irrigation management policy and also to improve the capacity of organization units involved in irrigation management and those staff capabilities in line with the new irrigation management policy.

The target of institutional strengthening is to establish WUA in the whole service area of the scheme and to practice collection of irrigation water charge as membership fee of WUA in the form of either “in cash” or “in kind”.

CHAPTER 3 DEVELOPMENT PLAN

3.1 Determination of Irrigation Area

(1) Data and Information used for the Formulation of Rehabilitation Plan

Data and information used for the formulation of rehabilitation plan are as follows:

- 1) General topographic map
National Geographic Bureau (Scale: 1/50,000, 1991)
- 2) Hydrological data
Meteorological records at Masamba meteorological station
Discharge record of the Kalaena Kiri River
- 3) Design references
Design Report of Kalaena Kiri Irrigation Scheme (1997)
Inventory survey of the Existing Facilities and Agriculture Survey (2003 by JICA Team)

(2) Intake Discharge Available from the Kalaena River

To assess the required intake discharge for the Kalaena Kanan and Kiri Schemes, a preliminary estimate was made with the following conditions:

Area: Total 18,500ha (Kanan 14,000 ha, Kiri 4,500 ha)

Design diversion requirement: $Q = 1.60$ liters/sec/ha (maximum)

Based on the above condition, the maximum diversion discharge at the headworks site is estimated at approximately $30 \text{ m}^3/\text{s}$ (Right: $23 \text{ m}^3/\text{s}$, Left $7 \text{ m}^3/\text{s}$). Judging from the average runoff of $58 \text{ m}^3/\text{s}$, water demand for the Kalaena Project (Kanan and Kiri) will be satisfied by the river runoff.

(3) Project Area

On the basis of the findings that there does not exist any constraint in suppling irrigation water under the present rehabilitation plan as stated earlier, the target area for the present development plan is finally determined to be 4,037 ha by excluding the command area of the Polo Secondary Canal (450 ha), where cacao trees at full fruit bearing stage exist as stated in Chapter 2 as shown below:

Original Potential Area	4,487 ha
Command Area of Polo Secondary Canal (Cacao Planted Land)	450 ha
Project Area	4,037 ha

The rehabilitation of the irrigation system and the development of irrigated paddy field in the entire project area are to be planned under the present rehabilitation plan aiming at the recovery of sustainable irrigation agriculture in the area and the improvement and enhancement of land productivity of the project area.

(4) Assessment of Water Demands in the Field

The irrigation water requirements have been estimated based on a planning guideline prepared by MOSRI. Consumptive use of water has been estimated on the basis of the modified Penman method proposed by FAO. A percolation rate of 2 mm/day is applied for the dry season paddy, and 1 mm/day for the wet season paddy. The water requirement for land preparation for paddy is assumed to be 150 mm. The overall irrigation efficiency is assumed to be 60%.

On the conditions and assumptions stated above, the unit diversion irrigation water requirement for paddy is estimated at 1.55 liters/sec/ha (in August), and details are shown in Table B-3.1.1 to B-3.1.2.

(5) Confirmation of Available Water from the Kalaena River

Based on the calculation results stated above, the intake discharge at the intake weir site is estimated at $Q_L = 6.257 \text{ m}^3/\text{sec}$ for the maximum irrigation area of 4,037 ha, and $Q_R + Q_L = 28 \text{ m}^3/\text{sec}$ for the total irrigation area of 18,037 ha including the right bank area. As the average runoff of the Kalaena river is $58 \text{ m}^3/\text{sec}$, and probable runoff expected 4 out of 5 years is estimated at $30 \text{ m}^3/\text{sec}$, water demand for the both project areas of Kalaena will be satisfied by the river runoff.

3.2 Rehabilitation Plan for Irrigation Facilities

3.2.1 Design of Rehabilitation of Irrigation Facilities

(1) Grade of Rehabilitation

Design of rehabilitation of irrigation facilities has been carried out on the basis of the inventory survey results of the respective irrigation facilities. Design of rehabilitation has been made considering a) estimate of degree of damage of facilities by using the survey results and the photos, b) preparation of design drawings for rehabilitation, and c) estimate of quantities and costs. All the existing facilities are classified into 4 rehabilitation grades, namely RG1 to RG4:

RG1: No rehabilitation

RG2: Minor rehabilitation

RG3: Large-scale rehabilitation

RG4: Replacement or new construction

(2) Rehabilitation Plan

The features of the rehabilitation of the respective facilities are shown in Tables B-3.2.1 to B-3.2.3 for the headworks, main canal and related structures of the main canal and summarized as below:

Summary of Rehabilitation Works of Irrigation Facilities

Facilities	Works of Rehabilitation
Headworks	<ul style="list-style-type: none"> * Removal of sedimentation in front of the intake, scouring sluice and upstream apron * Repair of the stilling basin * Provision of protection works downstream of stilling basin by concrete blocks and gabion river protection blocks * Provision of a new settling basin near the headworks * Repair of gate works and provision of a trash rack in front of the intake
Irrigation Canals	<ul style="list-style-type: none"> * Removal of sedimentation inside of the canal * Provision of drainage ditch and facilities at the excavation section of canal * Provision of concrete lining in the unlined section * Provision of kilometer and hectometer posts for O&M
Related structures	<ul style="list-style-type: none"> * Repair of gates * Repair/provision of measuring devices * Provision of safety facilities at the siphon and aqueduct * Removal of clogging/sedimentation inside of the drainage culvert * Provision of bridges for O&M and for rural infrastructures
Inspection Roads	<ul style="list-style-type: none"> * Repair of whole length and provision of gravel pavement * Provision of related facilities such as ditches, drain inlets, and safety facilities
On-farm Terminal Facilities	<ul style="list-style-type: none"> * Provision of appropriate facilities as standard requirements * Provision of gravel pavement for farm machinery

Table B-3.2.4 shows the hydraulic design of the main canal under the development plan ($Q = 6.257 \text{ m}^3/\text{s}$). The general layout, irrigation diagram, rehabilitation plan of irrigation canals and plan and profile of canals are shown in DRAWINGS attached at end of this report.

3.2.2 Work Quantities for Rehabilitation

The work quantities for rehabilitation have been calculated based on the rehabilitation plan. Work quantities for each structural item have been calculated as shown in Table B-3.2.5. Regarding the calculation of work quantities of the secondary canals, the estimate of work quantities has been made in proportion to the area of the secondary system, of which work quantities were actually estimated.

3.3 Agriculture

3.3.1 Land Use Plan

The entire project area had once been developed for irrigated paddy fields with tertiary facilities. Currently, parts of the paddy fields are under rainfed conditions and planted with young cacao trees. In the agriculture land use plan, the recovery of paddy fields currently under rainfed conditions and the re-conversion of cacao planted fields into irrigated paddy fields are envisaged as shown in Table B-3.3.1 and as follows;

Land Use Plan

Land Use Category	Present (ha)	With Project (ha)	Increment (ha)
Irrigated Paddy Field	2,375	4,037	1,662
Rainfed Paddy Field	832	-	- 832
Cacao Planted Paddy Field	830	-	- 830
Project Area	4,037	4,037	0
Tree Crop Land (alih fungsi)	450	450	-
Original Potential Area	4,487	4,487	-

The re-conversion of cacao planted fields is the general consensus of the representatives of subject beneficiary *desas* as stated earlier and the re-conversion is justified from the farm economic view point as shown in Table B-3.3.2.

3.3.2 Planned Cropping Pattern and Schedule

Under the present Study, the selection of crops to be introduced in the planned cropping pattern in the Scheme has basically been made observing the current cropping patterns prevailing in the subject area, which represent farmers intension and capabilities to a certain extent. The crop selection has been made as follows;

- (a) The introduction of double cropping of paddy is envisaged in the whole scheme from the farmers preferences for a crop and the volume of market demands. As most of the beneficiaries are transmigrates from Java, Bali and Lombok, it is expected that the introduction of the double cropping will be achieved as planned,
- (b) For the rational utilization of irrigation water resources, the increase of cropping intensity with the available water in the cropping season between the double crops of paddy (dry season I) by introducing palawija is envisaged to the greatest possible extent, and
- (c) Maize, palawija currently cropped in the Scheme or its surroundings, was selected as a crop in the 2nd cropping season following the 1st paddy. Maize (hybrid) has been selected as it appears to be the most promising crop among palawija from a national economic and marketing viewpoint. Palawija area has been set at 10% of the scheme

area in the dry season I.

The planned cropping pattern and schedule have been formulated on the basis of: i) current cropping pattern & schedule in the Scheme, ii) recommended cropping schedules of an agriculture agency, iii) climatic conditions and iv) water balance study as shown in Figure B-3.3.1 and summarized below.

Planned Cropping Pattern & Schedule

Season	Pattern (Crop & Intensity)	Schedule
Wet Season	Paddy (100%)	Beg. Jan. – mid. Feb. ~ early Apr. – mid. May
Dry Season I	Palawija (maize; 10%)	Early Apr. ~ early July.
Dry Season II	Paddy (100%)	Big. July – mid. Aug. ~ early Oct. – mid. Nov.
Annual	Paddy - palawija - paddy (210%)	

3.3.3 Planned Cropped Area and Cropping Intensity

In accordance with the planned cropping pattern and the selected crops discussed earlier, the target cropped areas and cropping intensities in the scheme under the present Study are planned as shown in Table B-3.3.1 and summarized below.

Planned Cropped Area & Cropping Intensity

Crop	Wet Season		Dry Season I		Dry Season II		Annual	
	Area (ha)	Ratio (%)	Area (ha)	Ratio (%)	Area (ha)	Ratio (%)	Area (ha)	Ratio (%)
Paddy	4,037	100	-	-	4,037	100	8,074	200
Palawija *1	-	-	404	10	-	-	404	10
Cacao	-	-	-	-	-	-	0	0
Total	4,037	100	404	10	4,037	100	8,478	210

Note *1: Hybrid maize

The increase of annual cropped area of some 2,500 ha of paddy and about 400 ha of palawija from the present level is planned under the Study as shown in Table B-3.3.1. Further, the increase of paddy cropping intensity of 62%, the same of palawija cropping intensity of 10% and the same of overall intensity of 51% is envisaged. While, the decrease of cacao planted area of 830 ha will result of the re-conversion of the area.

3.3.4 Target Crop Yields and Crop Production Plan

Target yields of paddy and palawija are estimated based on yield levels attained by advanced farmers in the Scheme, yield levels in advanced irrigation schemes in Luwu Utara District and information on potential yield levels provided by the Extension Coordinator as shown in Table B-3.3.1 and summarized below.

Target Yields under the Study

Cropping Season/Crops	Present Yield	Target Yield	Increase
Wet Season Irrigated Paddy	4.0 t/ha	5.0 t/ha	1.0 t/ha
Dry Season Irrigated Paddy	4.0 t/ha	5.0 t/ha	1.0 t/ha
Wet Season Rainfed Paddy ^{*1}	3.0 t/ha	-	-
Palawija (hybrid maize)	-	5.0 t/ha	-
Cacao (dry bean) ^{*2}	Not fruiting	-	-

Note *1: Paddy being grown under rainfed condition in irrigation command area

*2: Fruiting age: from 3rd year to over 20th year --- yield level 0.6 ~ 1.7 t/ha

The target yield of 5.0 t/ha is an increase of 1.0 t/ha from the present yield level of 4.0 t/ha in irrigated fields and an increase of 2.0 t/ha from the present yield level of 3.0 t/ha in paddy field under rainfed condition.

On the basis of the target crops yields and the planned cropping pattern, the with-project crop production are estimated as shown in Table B-3.3.1 and summarized in the following table.

Planned Crop Production

Crop	Present (ton)	With Project (ton)	Increment (ton)
Paddy	21,496	40,370	18,874
Palawija	-	2,020	2,020
Cacao ^{*1}	496 ~ 1,411	-	- 496 ~ - 1,411

Note *1: Production after start of fruit production

As shown in the table, the production increases of some 18,900 tons of paddies and 2,000 tons of palwija (maize) are estimated under the with-project condition. On the other hand, the annual decreases in production volume of cacao beans are estimated to be in the range of 500 tons to 1,400 tons from the without project condition.

3.3.5 Crop Budgets

The planned crop budgets per ha for irrigated paddy and palawija (maize hybrid) are estimated as shown in Table B-3.3.3 and summarized in the following table.

Planned Crop Budget per Ha

Crops	Yield (t/ha)	Gross Return (Rp.000)	Production Cost (Rp.000)	Net Return (Rp.000)
Irrigated Paddy (wet/dry season)	5.0	6,500	2,380	4,120
Maize (hybrid)	5.0	5,000	2,180	2,820

3.3.6 Farm Economy

A farm economic analyses under the present Study has been made to examine capacity-to-pay or possible contribution of O&M costs by beneficiary farmers

after the project and made on 1 ha of irrigated paddy field or rainfed paddy field by estimating net farm income from the fields as discussed earlier in Section 1.4.8.

The results of the farm economic analyses thus made are summarized below:

Estimated Net Farm Income from 1ha of Field

Land Use Category	Net Farm Income (Rp.000)			Cropping Pattern Assumed
	Present	With Project	Increment	
Irrigated Paddy Field	6,340	8,522	2,182	Paddy (1ha) - maize
Rainfed Paddy Field	2,420	8,522	6,102	(0.1ha) - paddy (1ha)

3.3.7 Agriculture Extension Services Strengthening Plan

(1) Constraints for Development

Most of the beneficiaries of the Scheme are transmigrants from Java, Bali and Lombok and it appears they are well motivated to the introduction of intensive irrigation farming focused on paddy production and they have enough experience in paddy cultivation. Therefore, major constraints for the attainment of the agriculture development targets stated in the previous sections, which are to be duly addressed in the agriculture extension services strengthening (AESS) under the present plan, are rather non-technical issues and include;

- 1) Farmers' Groups (KTs) yet to be empowered to a great extent, especially toward the introduction of agri-business oriented farming activities with collaboration among group members and groups (Constraints 1),
- 2) Insufficient extension services; insufficient capability of extension staff especially in post-harvest & marketing aspects, lack of facilities and equipment (BPP), limited of operation funds & transportation and limited coverage of extension services and activities of PPLs (Constraints 2),
- 3) Farmers in newly irrigated fields have limited experience in irrigation water management; intensive guidance to these target groups is essential in the fields of tertiary level and on-farm water management (Constraints 3),
- 4) Shortage of hand tractors for land preparation is expected under the with-project condition and improvement of product quality is a further step of the irrigated paddy farming that the Scheme should target; strengthening of UPJA is essential from the initial stage of the rehabilitation plan in order to attain the expected project benefits from an early stage of the development (Constraints 4), and
- 5) Participatory approaches for development are yet to be introduced; to

these constraints a mass guidance/campaign, workshops and farmer/farmers' groups training or empowerment are considered essential (Constraints 5), and

- 6) Other constraints include: i) serious rat infestation in rainfed areas, ii) recommended farming practices not yet adopted and iii) poor or no irrigation water management due to limited water supply (Constraints 6).

(2) Agriculture Extension Services Strengthening (AESS)

The agriculture extension services programs formulated to meet the requirements discussed in the section above are presented in Table B-3.3.4 and summarized as follows;

Institutional Strengthening Package Program (Constraint 2)

- Establishment of Regional & Sub-regional Task Force Team for AESS
- Staff empowerment program (capacity building of regional & sub-regional & extension staffs)
- Strengthening of extension facilities

Farmer Organizations Empowerment Package Program (Constraint 1&4)

- Empowerment of KTs toward agri-business oriented groups
- Empowerment & formation of UPJA
- Agribusiness Promotion Package Program

Technical Guidance Package Program (Constraint 3&6)

- Technical development, technical demonstration, farmer/farmers' group training, study tours, field schools etc.

Participation Enhancement Package Program (Constraint 5)

- Workshop, mass guidance & campaign etc.

Under the present plan, the provision of farm inputs or farm credit has not been accommodated since the requirements for the same could not be estimated and the justification of dual investments of public funds to the target scheme in addition to a heavy investment for rehabilitation works is doubtful.

The implementation of these strengthening programs should be started from the commencement of the construction works for the period of at least 5 years or up to 3 years after the completion of the construction works. The proposed implementation schedules for AESS are shown in Table B-3.3.1 and B-3.3.5 in detail. The overall program costs are estimated at Rp. 676 million as shown in Table B-3.3.5.

3.4 Institutional Strengthening Plan

The institutional strengthening plan for the scheme consists of two programs in the initial stage, i.e. institutional capacity building and staff capability improvement program, and WUA establishment acceleration program. For WUA already established, four programs will be implemented to upgrade WUA's activities. These are WUA strengthening program, FWUA and MWUA initial setting-up program, training program on operation and maintenance of tertiary irrigation systems, and guidance program for setting and collection of irrigation service fee. For WUA to be newly established, these four programs will also be carried out as follow-up measures in parallel with implementation of the rehabilitation works of the irrigation scheme.

(1) Institutional Capacity Building and Staff Capability Improvement Program

This program contains two components. One is to enable irrigation officials of Luwu Utara District to understand and practice the new irrigation management policy. The other is to improve the capacity of organization units of Luwu Utara District Government involved in irrigation management and those staff capabilities in line with the new irrigation management policy.

The first component will be done through undertaking a series of seminar and workshops to be facilitated by the central government after the legal framework of water resources and irrigation management is completed. Its program formulation and budget arrangements will be also made by the central government.

The second component should reflect the above nationwide dissemination of the new irrigation policy by the central government. This component will be done as follows:

- To evaluate the capacity of district/municipal government authorities and the capability of those staff involved in irrigation management activities;
- To identify needs for improving institutional capacity and staff capability to cope with the new irrigation management policy as well as supporting requirements for fulfillment of such needs through technical assistance by central/provincial government; and
- To formulate implementation programs on institutional capacity building and staff capability improvement for the respective district/municipal government authorities involved in irrigation management.

Regarding budget arrangements for these implementation programs, the main source is Luwu Utara District Government budget to cover the cost for institutional capacity building and staff capability improvement, while the

supplemental source is the provincial government budget to cover the cost for implementation of the supporting menus.

In implementing the institutional capacity building and staff capability improvement program, a group of trainers will be organized by inviting well experienced specialists from consultants, NGOs and universities. Monitoring and supervision of the program implementation should be carried out continuously by relevant organization units at the provincial level throughout the program implementation stage with periodical reporting on performance and impact of the program implementation.

(2) WUA Establishment Acceleration Program

To accelerate WUA establishment up to the target level in the scheme in order to ensure participatory irrigation management, the program is to be implemented based on the following steps:

- hold socialization meeting and workshops to invite representatives and members of Farmers' Groups which are available in non-WUA tertiary blocks for the purpose of accelerating WUA establishment and promoting participatory irrigation management;
- confirm farmer's awareness to establish and participate to WUA as well as farmer's needs for guidance about procedures and practices of WUA establishment;
- formulate a guidance menu list, and make a package program of guidance menus to accelerate WUA establishment in non-WUA tertiary blocks to which irrigation water is distributed; and
- estimate unit cost of each guidance menu and total cost of package program.

Budget to implement the package program for WUA establishment acceleration is to be covered by the project financing.

In implementing the WUA establishment acceleration program before starting rehabilitation works, consultants, NGOs and/or universities are to be recruited as facilitators and supporters in the irrigation command area.

(3) WUA Strengthening Program

The WUA Strengthening Program will be conducted based on the following steps:

- hold WUAs' awareness raising workshops to address weak points elaborated from recapitulating data on the latest monitoring and evaluation (M & E) record on WUA's performance;
- identify technical assistant requirements for improving WUA's capacity

to manage organization, capability to conduct operation and maintenance of tertiary irrigation system, and/or activities to set and collect WUA member's fees;

- formulate a technical assistant menu list and make a package program of technical assistance menus according to WUA's needs to improve its capacity, capability and/or activities; and
- estimate unit cost of each technical assistant menu and total cost of the package program.

Budget for implementing the package program for strengthening WUA is to be covered by the project financing.

In implementing the WUA strengthening program before starting rehabilitation works, consultants, NGOs and/or universities are to be recruited as facilitators and implementers in the irrigation scheme area.

(4) FWUA and MWUA Initial Setting-up Program

The FWUA and MWUA initial setting-up program will be conducted based on the following steps:

- imbue the local society with the necessity of setting up representative groups of WUA to cope with the participatory irrigation management policy if FWUA/MWUA has not been established;
- formulate a guidance menu list, and make a package program of guidance menus to support initial setting-up of FWUA/MWUA according to the current situation in the scheme; and
- estimate unit cost of each guidance menu and total cost of the package program.

Budget for implementing initial setting-up program of FWUA and MWUA is to be covered by the project financing.

In implementing the initial setting-up of the FWUA and MWUA program, consultants, NGOs and/or universities are to be recruited as facilitators and supporters in the irrigation scheme area.

(5) Training Program on Operation and Maintenance of Tertiary Irrigation Systems

This training program will be done after completing the rehabilitation works of the irrigation system. For this purpose, however, preparation of training manuals and programs should be done in parallel with the final stage of the rehabilitation works. Also the concept of training program should synchronize with the

irrigation water allocation plan to tertiary blocks as well as the cropping pattern and planting schedule in the irrigation command area.

As this training will be done as one of the rehabilitation project components, a consultant under the project manager is responsible for preparing training manuals, formulating training programs, estimating training costs and implementing training programs. To ensure effective and efficient implementation of training on operation and maintenance of tertiary irrigation systems, NGOs and other volunteers will be encouraged to become involved in training activities at the field level in addition to the project staff, District Government officials and consultant.

Budget arrangements based on the consultant's cost estimate are the responsibility of the project manager.

(6) Guidance Program for Setting and Collection of Irrigation Service Fee

In parallel with preparation of guidance manuals, the following points will be considered:

- identify issues on book keeping systems, fee determination methods, payment form, fee collection system and payment schedules;
- identify issues affecting fee allocation systems to cover administration, operation, maintenance and other miscellaneous cost;
- identify incentives to members;
- formulate a guidance menu list and a package program of guidance menus for collection and expenses of irrigation service fees; and
- estimate unit cost of each guidance menu and total cost of the package program.

Budget arrangements based on the consultant's cost estimate are the responsibility of the project manager.

In formulating and implementing the guidance program for collection and expense of irrigation service fees, special attention will be paid to recruit a consultant with specific experience matching with the above terms.

(7) Cost Estimate for Institutional Strengthening Plan

The overall cost for the proposed institutional strengthening plan in the above is estimated at Rp. 396 million in total. The breakdown of estimated cost is as follows:

- Rp. 10 million for Institutional capacity building and staff capability improvement program for Water Resources Sub-service of Luwu Utara District *KIMPRASWIL* based on unit cost of Rp. 5 million and 2-time implementation;

- Rp. 33 million for WUA establishment acceleration program targeting beneficiary farmers in non-WUA tertiary blocks based on unit cost of Rp. 20,000/ha and the existing WUA's coverage area of 1,662 ha;
- Rp. 48 million for WUA strengthening program to upgrade WUA based on unit cost of Rp. 20,000/ha considering the existing level and WUA's coverage area of 2,375 ha;
- Rp. 81 million for FWUA and MWUA initial setting-up program based on unit cost of Rp. 20,000/ha and the proposed recovery area of 4,037 ha;
- Rp. 143 million for training program on operation and maintenance of tertiary irrigation systems based on unit cost of Rp. 35,400/ha and the proposed recovery area of 4,037 ha; and
- Rp. 81 million for guidance program for setting and collection of irrigation service fees based on unit cost of Rp. 20,000/ha and the proposed recovery area of 4,037 ha.

3.5 Environmental Aspect

Environmental assessment is now accepted as key part of the development planning and is as important as economic analysis in project evaluation. In this Study, however, such assessment has not been conducted, as the objective of the Study is to recover the function of the existing infrastructures. Nonetheless, environmental assessment for rehabilitation project is no less important than that of the new development project as far as environmental impact exists. In this regard, it is proposed to carry out an environmental assessment prior to the implementation of the project on the basis of the following law and regulation:

- Law No.23/1997 concerning environmental management, and
- Government Regulation No.27/1999 concerning environmental impact assessment

CHAPTER 4 COST ESTIMATE

4.1 Conditions of Project Cost Estimate

Project costs for the proposed project works including construction cost for rehabilitation, consulting services fee, administration cost (salary for the office staff and expenditures for office management), and costs for institutional and extension service strengthening are estimated on the basis of the following conditions:

- (a) All the civil works of the project will be executed on a contract basis. Contractors will be selected through international competitive bidding.
- (b) Physical contingency of each work is assumed to be 15%.
- (c) Price contingency is not counted taking into account the short construction period.
- (d) Costs for institutional strengthening and extension service strengthening are assumed to be 2% of the total costs of civil works construction.
- (e) Cost for the consulting services is assumed to be 7% of the costs for civil works and works described in (d) above.
- (f) Administration cost of the project office is assumed to be 2.5% of the costs for civil works and works described in (d).
- (g) Exchange rate used for the estimate is US\$1.00 = Yen 118.9 = Rp. 8,279 as of May 2003, and
- (h) Currency for cost estimate is expressed in Indonesian Rupiah (Rp.)

4.2 Project Cost

(1) Direct Construction Cost

The direct construction cost is estimated based on the calculated work quantities of the proposed project works and unit prices of the works. The unit prices are based on those for similar works quoted in recent engineer's estimates of the South Sulawesi Province such as SSIMP-III and DISIMP Project.

The direct construction cost is estimated at Rp. 54,959 Million (equivalent to US\$ 1,644 per ha or Rp. 13.6 million, A= 4,037 ha). The breakdown of direct construction costs is shown in Table-B.4.2.1 and summarized as follows.

Summary of Direct Construction Cost

Work Description	Amount (million Rp.)
I. Headworks	6,800
II. Main Canal Works	18,778
III. Secondary Canal Works	15,670
IV. Drainage Works	3,445
V. On-Farm Development	8,697
VI. Project Facilities	1,570
Total	54,959

(2) Other Costs

Other costs are estimated as shown below:

- Costs for institutional and extension service strengthening: Rp. 1,100 x 1,000
- Cost for the consulting services: Rp. 3,924 x 1,000
- Administration cost of the project office: Rp. 1,402 x 1,000

(3) Project Costs

Project costs are estimated at Rp. 61.4 billion as shown in the following table:

Breakdown of Project Costs

Work Description	Costs (million Rp.)
I. Civil works	54,959
II. Institutional and extension service strengthening	1,100
III. Consulting services	3,924
IV. Project administration cost	1,402
Total	61,385

CHAPTER 5 PROJECT IMPLEMENTATION

5.1 General

The implementation of rehabilitation work of the Kalaena Kiri Irrigation Scheme is urgently required for the recovery of function of the existing irrigation scheme to cope with progressing deterioration of the facilities. Implementation schedule of the rehabilitation work after the feasibility study is shown in Figure B-5.3.1 and briefed as follows:

- (a) Preparation of Implementation Program (I/P) and budget arrangements,
- (b) Establishment of project office,
- (c) Preparation of detailed design with tender documents including field survey and investigation,
- (d) Tender and selection of contractor(s),
- (e) Execution of civil construction and taking over of completed irrigation scheme, and
- (f) Execution of strengthening program such as institutional and extension services.

5.2 Implementation Schedule

5.2.1 Schedule on Initiation Stage and Construction Works

- (1) Establishment of Project Office

The project office so-called “Function Recovery Project Office” is to be established at Dinas PSDA. Organization and staffing are to be restructured and transferred from other divisions. At the same time, “Function Recovery Forum” is also established. (Details are presented in Chapter 7 of Part 1 of this Report)

- (2) Preparation of I/P and Budget Arrangements

Preparation of I/P is to be made by the Dinas PSDA for the submission to DGWR for its approval. DGWR has to make arrangement for budget by means of national fund and/or loan from the international lending agencies.

- (3) Preparation of Detail Design

Immediately after completion of budget arrangement and office establishment, the detailed design including field survey and field investigation, and preparation of the tender documents are to be followed. Period for the detail design is estimated to be less than 12 months.

(4) Tender and Selection of Contractor(s)

Tender and its schedule are to be as follows:

- Number of contract: 2 contracts
- Tender call to contract signing: 6 months
- Construction period: 2 years

(5) Construction and Taking Over

Immediately after the contract signing, the construction is commenced. The construction management works including supervision work and quality control are to be carried out by the construction section of the project office. The completed scheme of the rehabilitation works is to be inspected, and after verification by the authority, the scheme is taken over by the provincial government for the commencement of operation.

5.2.2 Strengthening Program

The strengthening programs both institutional and extension service program are commenced with following elements and schedule.

(1) Institutional Strengthening Program

Elements of institutional strengthening program are as follows:

- (a) Institutional capacity building and staff improvement program,
- (b) WUA strengthening program,
- (c) FWUA and MWUA initial setting-up program,
- (d) WUA establishment acceleration program,
- (e) Training for operation and maintenance of tertiary irrigation system program, and
- (f) Guidance program for collection and expense of irrigation management fee.

(2) Extension Services Strengthening Program

Elements of extension services strengthening program are as follows:

- (a) Formulation of strengthening program,
- (b) Formulation of task force team,
- (c) Formulation of implementation program, and
- (d) Implementation of strengthening program.

(3) Budgeting and Budget Implementation

In discussing the preparation of budget proposals and implementing of budget to be allocated to the function recovery program, special attention has to be paid to the following key issues related to the modified irrigation management policy

in line with the draft of new Law on Water Resources:

- (a) Arrangement of irrigation management responsibility between irrigation water suppliers and water users,
- (b) Arrangement of irrigation management responsibility among government authorities,
- (c) Funding criteria, and
- (d) Mechanism of budget arrangement and utilization

Among irrigation management activities, the responsibility of planning and design works for development, rehabilitation and upgrading purposes is arranged to governments at central and provincial level to assure quality of outputs from these works. Regarding implementation of physical works, it can be considered that the budget availability, staff capability and contractor capacity are crucial factors at district/municipal level in a sense of participatory irrigation management.

CHAPTER 6 PROJECT EVALUATION

6.1 General

The economic evaluation of the present Study has been made to assess the financial and economic feasibility of the rehabilitation plan (the project). The approaches or assumptions applied for the project evaluation are as follows;

- Economic evaluation has been made by estimating project benefits between the without-project and the with-project conditions,
- For the project evaluation, economic internal rate of return (EIRR), financial return per ha, economic benefit-cost ratio (B/C) and economic benefit minus cost (B-C) have been examined,
- For the evaluation, project benefits have estimated based on crop production benefits and indirect or intangible benefits have not been counted,
- To assess the economic viability of the project to possible changes in project costs, project benefits and build-up period, a sensitivity analysis has been made,
- For financial evaluation of the project, the capacity to pay of beneficiary farmers have been analyzed,
- Without-project condition has been assumed to be the same as the present condition as the reliable prediction or estimation of the without-project conditions was not possible and impractical,
- The useful life of the Project was taken as 30 years from project implementation,
- Exchange rate of Indonesian Rupiah (Rp.) to US. Dollar (US\$) was taken to be Rp. 8,279 equivalent to US\$ 1.00 (as of May, 2003), and
- Constant prices at 2003 level were used in the economic evaluation.

6.2 Economic Evaluation

6.2.1 Project Costs

(1) Project Costs

The project costs for economic evaluation would consist of i) construction cost, ii) institutional & extension services strengthening costs, iii) consulting services cost, iv) administration cost, v) O&M costs, and vi) replacement cost. The economic project costs have been calculated from the financial project costs by applying the

standard conversion factor with 0.90. The economic project costs estimated accordingly are shown in Table B-6.2.1.

6.2.2 Project Benefits

(1) Economic Prices of Farm Inputs and Outputs

Economic prices of farm inputs and outputs were estimated in order to evaluate the expected project benefits. Economic prices of trade goods such as rice, maize, soybeans, groundnuts and fertilizers were estimated on the basis of the projected world market prices of these commodities forecast by the World Bank. Non-trade goods were valued at financial prices which were estimated on the basis of current market or farm gate prices. Farm labor was valued at the shadow wage rate of 0.80. The economic prices of farm inputs and outputs applied for the economic evaluation are presented in Table B-6.2.2 and B-6.2.3.

(2) Project Benefits

Only the crop production benefits are assessed as the project benefits as stated earlier. The net project benefits are defined as the difference in net return from crop production between the with-project and the with-out project conditions. The without-project condition has been assumed to be the same as the present condition as stated earlier. The economic crop budgets applied for the estimation of the net return under the project are as presented in Table B-6.2.4 and B-6.2.5. The project benefits expressed as the incremental net production value from crop production are estimated as shown in Table B-6.2.6.

The annual economic project benefits at full development stage (the incremental net production value) have been estimated at Rp. 11.5 to 19.6 billion (depending on the cacao production under the without project) as shown in Table B-6.2.6 and summarized below.

Economic Project Benefits/Incremental Net Production Value ^{*1}

Net Production Value (million Rp.)		
Without Project	With Project	Increment
15,532 - 23,608	35,107	11,499-19,575

Note *1: At full development stage

The benefits would gradually increase up to the full benefit in the 5th year after the completion of construction works.

6.2.3 EIRR, B/C and B-C

The annual economic costs and benefits flows and the results of the economic evaluation (EIRR, B/C & B - C) are presented in Table B-6.2.8 and as summarized below.

Results of Economic Analysis

EIRR	B/C	B – C (billion Rp.)
12.1 %	1.29	13.9

B/C & B - C at 10% discount rate

6.2.4 Sensitivity Analysis

To examine the project economic viability to changes in project cost, project benefits and build-up period, the sensitivity analyses have been made on the four cases as follows.

Results of Sensitivity Analysis

Case		EIRR (%)
0. No Changes	-	12.1
1. Change in Project Costs	+ 10 %	11.4
2. Change in Project Benefits	- 10 %	10.5
3. Benefit Delay	1 year delay	10.4
4. 1 + 2 + 3	-	8.5

6.3 Financial Evaluation

The capacities to pay of beneficiary farmers have been assessed based on the farm budget analyses on 1 ha of paddy field under the with and without project condition, which have been made by applying the results of the farm economic analyses made in Section 1.4.8 and 3.3.6, as shown in Table B-6.3.1 and as summarized below:

Results of Farm Budget Analyses on 1 ha of Paddy Field

Land Use Category	Net Reserve on 1 ha of Paddy Field (Capacity to Pay: Rp.000))		
	Without Project	With Project	Increase
Irrigated Paddy Field ^{*1}	6,340	7,670	1,330
Irrigated Paddy ^{*2}	2,420	6,820	4,400

*1. Farmers in current irrigated field.

*2. Farmers in current irrigation command area being under reinfed condition.

The capacity to pay of beneficiary farmers will increase from Rp. 2.4 ~ 6.3 million to Rp. 6.8 ~ 7.7 million or the increase of Rp. 1.3 ~ 4.4 million under the future with project condition. The increases would enable the farmers to bear their contributions to O&M cost of irrigation system.

6.4 Indirect Benefits and Socio-economic Impacts

After implementation of the Project, various indirect benefits and socio-economic impacts are expected as mentioned below.

- (1) Employment Opportunities

The Project would create a demand for farm labors due to the increased farming activity, more intensive use of land and higher agricultural production. In addition, the construction of the Project would increase employment opportunities in the area. During the construction stage, the majority of workers would be unskilled laborers, and most of whom would come from farmers and ordinary laborers in and around the Project area.

(2) Farmers' Income

After implementation of the Project, income of farmers is expected to increase considerably as a direct result of the increase in crop production. Such increase in income would contribute to improving farmers' living standards. Moreover, it is expected that farmers' purchasing power would increase along with improvement of their living standards, and this increased purchasing power would benefit the development of the regional economy.

(3) Marketing of Farm Inputs and Outputs

Future marketing in the project area is likely to expand as compared with the present condition. With anticipated higher agricultural production, more farm products could be marketed by the farmers and the proportion of sales would also increase relative to consumption. The merchants would have a larger turnover which could increase their incomes.

Marketing functions would not only be influenced by agricultural outputs. It is estimated that when agricultural production develops as a result of the Project, the Project area would be a good market for farm supplies. The farmers need to operate with farm supplies such as tools, equipment and bags. Both ends of marketing channels could, therefore, expect substantial beneficial impacts from the Project.

(4) Food Supply

The incremental production of paddy of some 18,900 tons under the with project condition will directly contribute to the supply-demand balance of rice and the food security in Indonesia.

(5) Other Effects

Implementation of the Project would certainly lead to changes in rural socio-economy in the area. By the construction of inspection roads along the canals, the local transportation system would also be improved, which will contribute to the improvement of rural socio-economic activities.

Tables

Table B-1.1.1 Climate at Masamba and Hydrology Record at Headworks Site

1. Monthly mean temperature (°C) at Masamba

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
1998	27.9	27.8	27.6	27.6	27.5	26.8	26.4	26.2	26.9	27.3	26.9	-	27.2
1999	26.8	26.8	26.4	27.0	26.4	26.1	25.8	25.8	26.9	26.7	26.7	27.2	26.6
2000	26.6	26.7	26.9	26.7	26.6	25.7	25.7	25.6	26.5	26.8	27.5	27.1	26.5
2001	26.4	27.2	26.8	26.9	27.0	26.1	26.1	25.8	26.6	27.6	27.1	26.7	26.7
2002	26.7	26.7	26.8	27.2	27.3	26.3	26.3	25.6	27.0	28.0	28.0	27.6	27.0
Average	26.9	27.0	26.9	27.1	27.0	26.2	26.1	25.8	26.8	27.3	27.2	27.2	26.8

Source: Monthly data supplied by Meteorological and Geophysical Agency Jakarta, Department of Communication

2. Monthly mean relative humidity (%) at Masamba

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
1998	81	83	84	85	85	86	86	85	83	82	85	-	84
1999	84	84	85	85	86	85	85	82	82	83	84	83	84
2000	84	84	82	85	86	88	86	85	80	83	82	83	84
2001	85	83	85	86	84	86	84	83	81	80	84	84	84
2002	85	85	85	85	85	87	83	81	78	73	78	83	82
Average	84	84	84	85	85	86	85	83	81	80	83	83	84

Source: Monthly data supplied by Meteorological and Geophysical Agency Jakarta, Department of Communication

3. Monthly rainfall at Masamba (mm)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
348	233	345	466	324	434	256	254	200	213	349	295	3,717

Source: Monthly data supplied by Meteorological and Geophysical Agency Jakarta, Department of Communication

4. Preliminary estimated monthly river flow data (m³/sec)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
61.3	69.1	69.8	62.7	58.0	57.4	55.4	51.8	46.6	50.2	63.1	51.9	58.1

Note: Water level record at upstream of Kalaena weir were preliminary converted to discharge by the JICA Study Team

5. Estimated monthly dependable flow (m³/sec)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
42.8	64.6	43.3	48.1	43.5	34.9	51.8	37.5	27.3	29.2	25.2	44.1	41.0

Table B-1.4.1 Basic Agriculture Conditions of Kalaena Kiri Scheme

(1/2)

1. Agro-demographic Features of Project Sub-districts & Desas

1.1 Farm Households & Land Tenure Status in Project Sub-districts and Desas in 2001

Agro-demographic Indicators	Sub-district Mangkutana	Project Sub-districts1/	Project Desas in Mangkutana	Project Desas 1/
Proportion of Farm Households to Total Households	86 %	86 %	80 %	80 %
Owner Farmer	2 %	2 %	5 %	5 %
Owner-cum-tenant Farmer	96 %	96 %	90 %	90 %
Farm Labor	2 %	2 %	5 %	5 %

1/: Assumed based on the figures in Mangkutana

Source: Dinas Pertanian Luwu Utara; Office file, BPP Mangkutana

1.2 Estimated Average Land Holding Size in Kalaena Kiri Scheme

Paddy Field (including cacao planted fields): ≈ 4,000 ha No. of Beneficiary Farm Households: ≈ 2,800
 Estimated Average Paddy Holding Size: 1.4 ha/farm household

Source: Result of Inventory Survey in Phase I Study, JICA Study Team

2. Agriculture Conditions

2.1 Present Land Use of Kalaena Kiri Scheme

Item	Land Use Category					Paddy Field Converted to Cacao Field	Original Potential Area for Irrigation
	Potential Area for Irrigation						
	Irrigated Paddy Field	Paddy Field under Rainfed Conditions	Cacao Planted Paddy Field	Total			
Area	(ha)	2,375	832	830	4,037	450	4,487
	(%)	59	21	21	100	-	-

Source: Findings of JICA Study Team (assumed in consultation with the irrigation offices of the Scheme)

2.2 Prevailing Cropping Schedule & Pattern in Kalaena Kiri Scheme

Paddy: Wet Season: Jan. - Feb. ~ Apr. - May.; Dry Season: June - July ~ Sept. - Oct. (planting ~ harvest)

Palawija: Cultivation is extremely limited.

Cropping Pattern: Irrigated Paddy Field --- wet season - dry season: paddy - paddy

Cropping Pattern: Paddy Field under Rainfed Conditions--- wet - dry season: paddy - fallow

2.3 Cropped Area & Intensity in Kalaena Kiri Scheme

Crop Year/Crops	Irrigated Paddy Field: 2,791 ha							
	Wet Season Paddy		Dry Season Paddy		Cacao		Annual	
	Area (ha)	CI(%)	Area (ha)	CI(%)	Area (ha)	CI(%)	Area (ha)	CI(%)
1998/1999 1/			2,058	74				
1999/2000 1/	2,177	78	2,457	88			4,634	166
2000/2001 1/	2,288	82						
Average	2,233	80	2,258	81	-	-	4,490	161
Present Condition Assumed 2/	2,375	85	2,375	85	416	15	5,166	185
Paddy Field under Rainfed Conditions: 1,246 ha								
Present Condition Assumed 2/	Wet Season Paddy		Dry Season Paddy		Cacao		Sub-total	
	Area (ha)	CI(%)	Area (ha)	CI(%)	Area (ha)	CI(%)	Area (ha)	CI(%)
	832	67			414	33	1,246	100
Overall Scheme - Paddy Field: 4,037 ha								
Present Condition Assumed 2/	Wet Season Paddy		Dry Season Paddy		Cacao		Sub-total	
	Area (ha)	CI(%)	Area (ha)	CI(%)	Area (ha)	CI(%)	Area (ha)	CI(%)
	3,207	79	2,375	59	830	21	6,412	159

1/: Source --- Proyek Irigasi Sulawesi Selatan

2/: Present conditions assumed on the basis of consultation with the irrigation services offices of the Scheme

Source: Dinas Pengairan, Sulawesi Selatan; Findings of JICA Study Team

Table B-1.4.1 Basic Agriculture Conditions of Kalaena Kiri Scheme

(2/2)

2.4 Crop Yield & Production in Kalaena Kiri Scheme

Cropping Season	Irrigated Paddy Field: 724 ha					
	Irrigated Paddy		Rainfed Paddy 1/		Cacao 2/	
	Yield (t/ha)	Production (t)	Yield (t/ha)	Production (t)	Yield (t/ha)	Production (t)
Wet Season	4.0	9,500	3.0	2,496		
Dry Season	4.0	9,500				
Annual	-	19,000		2,496	-	-

1/: Paddy cultivated under rainfed conditions in irrigated paddy field

2/: Assumed ages of cacao trees are less than 2 years old and fruit production not started yet.

Source: Findings of JICA Study Team; BPP Mangkutana office file

3. Agriculture Support Services

3.1 Extension Services

Project Sub-district	BPP	No. of PPL Deployed in Scheme			No. of PHT
		Male	Female	Total	
Mangkutana	Mangkutana (9 PPLs)	2	1	3	1
Angkona	Angkona (4 PPLs)	2	0	2	1

3.2 Support Facilities

Facility	Name	Location
District Agriculture Services Office	District Agriculture Services Office, Luwu Utara	To be established; Malili
BIPP	Balai Informasi Penyuluhan Pertanian	To be established; Malili
Seed Farm	Instalasi Kebun Benih Padi, Mangkutana	Kec. Mangkutana, L. Timur
Seed Farm	Balai Benih Utama, Bone-bone	Kec. Bone-bone, L. Utara
Agricultural High School	Sekolah Pembangunan M. A. Pertanian	Palopo, Kodya Luwu
Plant Protection Center	BTPPH, Maros	Maros
Experimental Station	BTPPH, Maros	Maros
Seed Supervision & Certification Office	BPSB, Maros	Maros

3.3 Farmers Organizations (Kelompok Tani, 2002)

Project, Sub-district	Kelompok Tani (KT)								Total			
	Primary		Secondary		Intermediate		Advanced		KTs		Member	
	No.	%	No.	%	No.	%	No.	%	No.	%	Total	per KT
Mangkutana	16	47	13	38	4	12	1	3	34	100	1,290	38
Angkona	60	97	2	3					62	100	2,431	39
Project Desas Total 1/	11	50	10	45	1	5	0		22	100	623	28

3.4 Farmer Organizations, Credit Institutions

Project Sub-district	KUD	Koptan	UPJA	BRI Branch
Mangkutana	3	5	0	0
Angkona	1	5	0	0
Project Desas Total 1/	2	3	0	0

1/: Figures on 5 project desas in Mangkutana sub-district only

Source: Findings of JICA Study Team; BPP Mangkutana office file

4. Agriculture Facilities & Machinery

Project Sub-district	Large Rice Mills	RMU	Small Rice Mills	Thresher		Huller
				Pedal	Power	
Mangkutana	1	26	2	485	44	42
Angkona	0	7	0	451	7	40
Project Desas Total 1/	n.a.	n.a.	n.a.	n.a.	31	17

Project Sub-district	Hand Tractor	4 Wheel Tractor	Harvester	Paddy Dryer	Paddy Cleaner	KIOSK (private)
Mangkutana	121	0	0	0	0	8
Angkona	38	0	0	0	0	29
Project Desas Total 1/	28	0	0	0	0	3

1/: Figures on 5 project desas in Mangkutana sub-district only

Source: Statistic data of District Agriculture Services Office, Luwu Utara; BPP Mangkutana office file

Table B-1.4.2 Financial Crop Budget per Ha under Present/Without Project: Kalaena Kiri

Items	Unit	Unit Price (Rp. 000)	Rainfed Paddy		Irrigated Paddy			
			Q'ty	Value (Rp. 000)	Wet Season		Dry Season	
					Q'ty	Value (Rp. 000)	Q'ty	Value (Rp. 000)
1. Gross Return								
Unit Yield	(t/ha)		3.0		4.0		4.0	
Unit Price	(Rp.000/t)			1,300		1,300		1,300
Gross Return	(Rp.000)			3,900		5,200		5,200
2. Production cost				1,483		2,026		2,026
2-1. Farm Inputs				294		581		581
Seed 1/	(kg)	2.0	30	60	30	60	30	60
Fertilizers				184		428		428
- Urea	(kg)	1.3	100	130	150	195	150	195
- SP36	(kg)	1.8	30	54	75	135	75	135
- KCl	(kg)	2.1	0	0	30	63	30	63
- ZA	(kg)	1.4	0	0	25	35	25	35
Agro chemicals				50		93		93
- Insecticide (liquid)	(lit)	50	1.0	50	1.5	75	1.5	75
- Insecticide (powder)	(kg)	30						
- Rodenticide	(kg)	35			0.5	18	0.5	18
- Herbicide	(kg)	30						
2-2. Labor Costs				690		895		895
Contracted Works								
- Transplanting 2/	(unit)		1	300	1	300	1	300
- Harvesting 3/	(unit)		10 %	390	10 %	520	10 %	520
Labor Requirements 4/								
- Hired Labor	(man-day)	15	0	0	5	75	5	75
- Family Labor	(man-day)		40		47		47	
Total	(man-day)		40		52		52	
2-3. Land Preparation				350		350		350
- Machinery	(unit)		1	350	1	350	1	350
- Draft Animal	(unit)							
2-4. Field Transportation	(L.S.)		2 %	78	2 %	104	2 %	104
2-5. Miscellaneous Expenses	(L.S.)		5 %	71	5 %	96	5 %	96
3. Net Return	Rp. 000			2,417		3,174		3,174
	%			62		61		61
	Rounded			2,420		3,170		3,170

1/: Seed price: Rainfed --- Rp. 2,000/kg; Irrigated field --- yield level < 5.0 Rp. 2,000/kg; yield level \geq 5.0 Rp. 3,200/kg

2/: Contract work for transplanting assumed --- Rp. 300,000/ha at financial price by 15 laborers

3/: Share harvesting (borogan) system assumed; cost 10 % of products

4/: Hired Labor Requirements --- assumed to be 10% of total labor requirements in irrigated field

Table B-1.5.1 Actual Receipts and Expenditures of Luwu Utara Government

(Unit: Rp. 000)

Receipt/Expenditure	Year 2000
A. RECEIPTS	62,794,249
1. Previous Year Surplus	0
2. Local Gov. Original Receipt	3,065,046
2.1 Local Taxes Receipt	562,108
2.2 Retributions Receipt	2,015,584
2.2.1 Retributions of public service	487,647
2.2.2 Retributions of commercial service	1,417,334
2.2.3 Retributions of special permits	110,603
2.3 Local Gov. Corporate Profit	0
2.4 Other Receipt	487,354
3. Income from Higher Level Gov. and/or Authority	59,729,203
3.1 Tax Share	4,455,042
3.2 Non Tax Share	13,783,703
3.3 Subsidies to Local Government	25,790,559
3.4 Development Contribution	10,072,100
3.5 Other Receipt	5,627,799
4. Local Government Loan	0
B. CURRENT EXPENDITURES	37,341,271
1. Personel Current Expenditure	25,745,492
2. Material Current Expenditure	3,590,148
3. Repair & Maintenance Current Expenditure	351,738
4. Official Travel Expenditure	1,405,255
5. Other Current Expenditure	3,180,413
6. Debt and Interest Repayment	1,800
7. Fund/Subsidy	1,028,267
8. Other Current Expenditure	307,713
9. Unpredicted Current Expenditure	1,730,445
C. DEVELOPMENT EXPENDITURES	19,018,678
1. Industry	54,200
2. Agriculture and Forestry	1,821,757
3. Natural Water Resources and Irrigations	99,899
4. Manpower	25,290
5. Trade, Unfolding Regional Initiative, Regional Financial and Cooperatives	287,432
6. Transportation	4,099,386
7. Mining and Energy	61,936
8. Tourism and Regional Communications	0
9. Regional Development and Resettlement	6,181,241
10. Environment and Lay Out	234,315
11. Education, National Culture, Credentials, Youth and Sport	1,074,650
12. Demography and Family Welfare	0
13. Health, Social Welfare, Women Participation, Child and Adolescent	456,224
14. Dwelling and Residence	0
15. Religion	0
16. Science and Technology	480,384
17. Law	29,976
18. Civil Servants and Control	4,096,988
19. Politics, Information, Communication and Mass Communication	0
20. Security and Public Order	15,000
21. Development Subsidies to Lower Level Gov.	0
D. TOTAL EXPENDITURES (B+C)	56,359,949

Table B-1.5.2 List of WUA in Karaena Kiri Irrigation Scheme

No.	Main & Secondary Canal	Tertiary Block	Service Area (ha)	Name of WUA	WUA Working Areal (ha)	No. of WUA Member (person)	Name of Village	Name of Sub-District	Approval by Bupati	
									Date	No.
1	Main	Kki 3 ki	84.00	Harapan	84.00	71	Kalaena Kiri	Mangkutana	06/07/94	39/BKDH/01/94
2		Kki 3 ka	84.00	Mandiri	84.00	32	Kalaena Kiri	Mangkutana	06/07/94	39/BKDH/01/94
3		Kki 4 ki	58.00	Kijang Mas	58.00	35	Kalaena Kiri	Mangkutana	06/07/94	39/BKDH/01/94
4		Kki 5 ka 2	62.00	Sumber Genteng	62.00	25	Kalaena Kiri	Mangkutana	06/07/94	39/BKDH/01/94
5		Kki 6 ki 1	61.00	Sari Mekar	61.00	38	Kalaena Kiri	Mangkutana	06/07/94	39/BKDH/01/94
6		Kki 6 ki 2	64.00	Dewi Karya	64.00	60	Kalaena Kiri	Mangkutana	06/07/94	39/BKDH/01/94
7		Kki 7 ki	75.00	Sumber Damai	75.00	20	Kalaena Kiri	Mangkutana	06/07/94	39/BKDH/01/94
8		Kki 8 ki	75.00	Sumber Makmur	75.00	15	Sumber Agung	Mangkutana	06/07/94	39/BKDH/01/94
9		Kki 9 ki	29.00	Sumber Bahagia	45.00	38	Sumber Agung	Mangkutana	06/07/94	39/BKDH/01/94
10		Kki 9 ka	70.00	Sumber Rejeki	70.00	40	Sumber Agung	Mangkutana	06/07/94	39/BKDH/01/94
11		Kki 10 ki	65.00	Suka Karya	58.00	47	Sumber Agung	Mangkutana	04/03/96	83/BKDH/Ir/96
12		Kki 10 ka	52.00	Dadi Karya	54.00	40	Sumber Agung	Mangkutana	04/03/96	83/BKDH/Ir/96
13		Kki 11 ki	50.00	Bunga Mekar	75.00	68	Sumber Agung	Mangkutana	04/03/96	83/BKDH/Ir/96
14		Kki 11 ka 1	37.00	Bali Karya	45.00	35	Sumber Agung	Mangkutana	04/03/96	83/BKDH/Ir/96
15		Kki 11 ka 2	46.00	Bakti Karya	46.00	30	Sumber Agung	Mangkutana	04/03/96	83/BKDH/Ir/96
16		Kki 12 ki	48.00	Wane Karya	75.00	65	Sumber Agung	Mangkutana	04/03/96	83/BKDH/Ir/96
17		Kki 13 ki 1	73.00	Melati Karya	80.00	40	Sumber Agung	Mangkutana	04/03/96	83/BKDH/Ir/96
18		Kki 13 ki 2	58.00	Citra Karya	69.00	54	Sumber Agung	Mangkutana	04/03/96	83/BKDH/Ir/96
19		Kki 14 ka 1	82.00	Bina Karya	74.00	70	Sumber Agung	Mangkutana	04/03/96	83/BKDH/Ir/96
20		Kki 14 ka 2	50.00	Sumber Karya	46.00	34	Sumber Agung	Mangkutana	04/03/96	83/BKDH/Ir/96
21		Kki 15 ki	36.00	Sumber Tirto	65.00	30	Argomulyo	Mangkutana		
22		Kki 16 ki 2	63.00	Sumber Rejeki	24.00	24	Balirejo	Angkona		
23		Kki 17 ka 1	67.00	Harapan	73.00	43	Balirejo	Angkona		
24		Kki 17 ka 2	37.00	Subur Jaya	75.00	51	Balirejo	Angkona		
25	Angkona	A 1 1 ki	58.00	Dadi Karya	56.00	48	Sumber Agung	Mangkutana	04/03/96	83/BKDH/Ir/96
26		A 1 2 ki	67.00	Darma Karya	54.00	40	Sumber Agung	Mangkutana	04/03/96	83/BKDH/Ir/96
27		A 1 2 ka	65.00	Mekar Melati	48.00	40	Sumber Agung	Mangkutana	04/03/96	83/BKDH/Ir/96
28		A 1 2 ka 2	20.00	Baru Karya	35.00	30	Sumber Agung	Mangkutana	04/03/96	83/BKDH/Ir/96
29	Tanjung	T 9 1 ka	45.00	Rejeki Mekar	49.00	42	Argomulyo	Mangkutana	04/03/96	83/BKDH/Ir/96
30	Sarikko	S 4 ki	42.00	Sumber Tirto	65.00	30	Argomulyo	Mangkutana		

Table B-2.1.1 Condition of Haedworks Assessed by Inventory Survey (October 2003)

	Structure	Condition	Problems
1.	Weir, overflow weir	B	Damaged/eroded surface of crest
2.	Retaining wall, upstream	B	Partially damaged/collapse
3.	Retaining wall, downstream	C	Foundation was eroded
4.	Stilling basin	C	Eroded and damaged
5.	Inspection bridge	B	Partially damaged at pier part
6.	Scouring sluice	C	Partially damaged at pier part, sediment in front of sluice
7.	Intake	C	Sediment in front of gate, clogging by foreign materials
8.	Gates of intake and scouring sluice	C	Required repair and replacement of some parts
9.	Upstream apron	C	Sedimentation and piling by foreign materials
10.	Downstream river protection	C	Partially washed away
11.	Settling basin	-	Not provided near weir site

Condition:

A: Functioning well, no rehabilitation is needed.

B: Partially damaged/deteriorated, minor rehabilitation is needed.

C: Not function well, large scale rehabilitation is needed.

D: Seriously damaged, replacement or reconstruction is needed.

Table B-2.1.2 Condition of Canal and Inspection Road Assessed by Inventory Survey (October 2003)

HM	BK	Distance (m)	Condition of Canal (m)				Description of Condition * ¹			Inspection Road * ²
			A	B	C	D				
0	BP									
		1,519	750	400	369		1	3		B
15.19	BKKi 1									
		890	500	250	140		1	3		B
24.09	BKKi 2									
		1,073	500	250	323		1	3		B
34.82	BKKi 3									
		857	400	250	207		1	3		B
43.39	BKKi 4									
		650	350	150	150		1	3		B
49.89	BKKi 5									
		1,060	500	250	310		1	3		B
60.49	BKKi 6									
		1,666	800	400	466		1	3		B
77.15	BKKi 7									
		728				728	1	3		B
84.43	BKKi 8									
		692				692	1	2	4	C
91.35	BKKi 9									
		552				552	1	2	4	C
96.87	BKKi 10									
		706				706	1	2	4	C
103.93	BKKi 11									
		898				898	1	2	4	C
112.91	BKKi 12									
		1,221				1221	1	2	4	C
125.12	BKKi 13									
		588				588	1	2	4	C
131	BKKi 14									
		793				793	1	2	4	C
138.93	BKKi 15									
		1,486				1486	1	2	4	C
153.79	BKKi 16									
		2,093				2093	1	2	4	C
174.72	BKKi 17									
		1,053				1053	1	2	4	C
185.25	BKKi 18									
		462				462	1	2	4	C
189.87	BKKi 19									
Total			3,800	1,950	1,965	11,272				

Description of Conditions *¹

1. Sedimentaion or obstruction of water flow
2. Collapse of canal
3. Craks of patial damage on lined canal
4. Difficulty on maintenance of eart canal

Inspection Road *²

- A: Functioning well, no rehabilitation is needed.
- B: Partially damaged/deteriorated, minor rehabilitation is needed.
- C: Not function well, large scale rehabilitation is needed.
- D: Seriously damaged, replacement or reconstruction is needed.

Table B-2.1.3 Condition of Related Structures on Main Canal Assessed by Inventory Survey (October 2003)

Structure	Hm	Name/Mark of Str.	Condition of Structure *1	Description of Condition	
				Civil works *2	Metal works *3
Drainage CV	1.61	BK. Ki 1a	B	1, 2	-
Drainage CV	5.29	BK. Ki 1b	B	1, 2	-
Sand trap	6.18	BK. Ki 1c	A	-	-
Measuring device	9.78	BK. Ki 1d	B	2	4
Siphon	11.98	BK. Ki 1e	B	3, 4	3
Division Str.	15.19	BK. Ki 1	B	2, 3	2, 4
Division Str.	24.09	BK. Ki 2	B	2, 3	2, 4
Division Str.	34.82	BK. Ki 3	C	2, 3	2, 4
Division Str.	43.39	BK. Ki 4	C	2, 3	2, 4
Drainage CV	48.58	BK. Ki 5a	C	1, 2	-
Division Str.	49.89	BK. Ki 5	C	2, 3	2, 4
Division Str.	60.49	BK. Ki 6	B	2, 3	2, 4
Drop	63.28	BK. Ki 7a	C	2	-
Drop	70.98	BK. Ki 7c	C	2	-
Bridge	76.85	BK. Ki 7d	B	6	-
Division Str.	77.15	BK. Ki 7	C	3	
Division Str.	84.43	BK. Ki 8	C	2, 3	2, 4
Drainage CV	85.91	BK. Ki 9a	C	1, 2	-
Bridge	88.79	BK. Ki 9b	C	5, 6	
Division Str.	91.35	BK. Ki 9	C	2, 3	2, 4
Division Str.	96.87	BK. Ki 10	C	2, 3	2, 4
Division Str.	103.93	BK. Ki 11	B	2, 3	2, 4
Division Str.	112.91	BK. Ki 12	C	2, 3	2, 4
Bridge	117.94	BK. Ki 13a	B	6	-
Division Str.	125.12	BK. Ki 13	C	2, 3	2, 4
Division Str.	131.00	BK. Ki 14	C	2, 3	2, 4
Division Str.	138.93	BK. Ki 15	C	2, 3	2, 4
Aqueduct	150.84	BK. Ki 16a	C	2, 4, 5, 6	3
Division Str.	153.79	BK. Ki 16	B	2, 3	2, 4
Drop	157.35	BK. Ki 17a	C	2, 4	
Division Str.	174.72	BK. Ki 17	C	2, 3	2, 4
Division Str.	185.25	BK. Ki 18	C	2, 3	2, 4
Division Str.	189.87	BK. Ki 19	C	2, 3	2, 4

Condition of Structure *1

- A: Functioning well, no rehabilitation is needed.
 B: Partially damaged/deteriorated, minor rehabilitation is needed.
 C: Not function well, large scale rehabilitation is needed.
 D: Seriously damaged, replacement or reconstruction is needed.

Description of Condition

Civil works *2

- 1: Removal of sediment in the barrels
 2: Repair of walls, slab, barrels
 3: Provision of slab bridge for traffic passing (T10 class)
 4: Provision of safety facility
 5: Repair of substructure
 6: Repair of superstructure
 7: Provision of measuring facility

Metal Works *3

- 1: Major repair of gates and hosts
 2: Provision of additional gates
 3: Provision of trash rack
 4: Painting and lubricating to facility

Table B-3.1.2 Hydrological Condition and Water Balance of Kalaena Kiri Scheme

1. Preliminary estimated monthly river flow data (m³/s)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
61.3	69.1	69.8	62.7	58.0	57.4	55.4	51.8	46.6	50.2	63.1	51.9	58.1

Note: Water level record at upstream of Kalaena weir were preliminary converted to discharge by the JICA Study Team

2. Monthly rainfall at Masamba (mm)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
348	233	345	466	324	434	256	254	200	213	349	295	3,716

Source: Monthly data supplied by Meteorological and Geophysical Agency Jakarta, Department of Communication

3. Catchment area at weir site

1,070 km²

4. Estimated monthly dependable flow (m³/s)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
42.8	64.6	43.3	48.1	43.5	34.9	51.8	37.5	27.3	29.2	25.2	44.1	41.0

5. 10-days basis water balance

Planned irrigation area (ha)

Kalaena Kanan I	6,615
Kalaena Kiri	4,037
Kalaena Kanan II	5,077
Kalaena (Rt. Bendung)	2,730
Total planned irrigation area	18,459

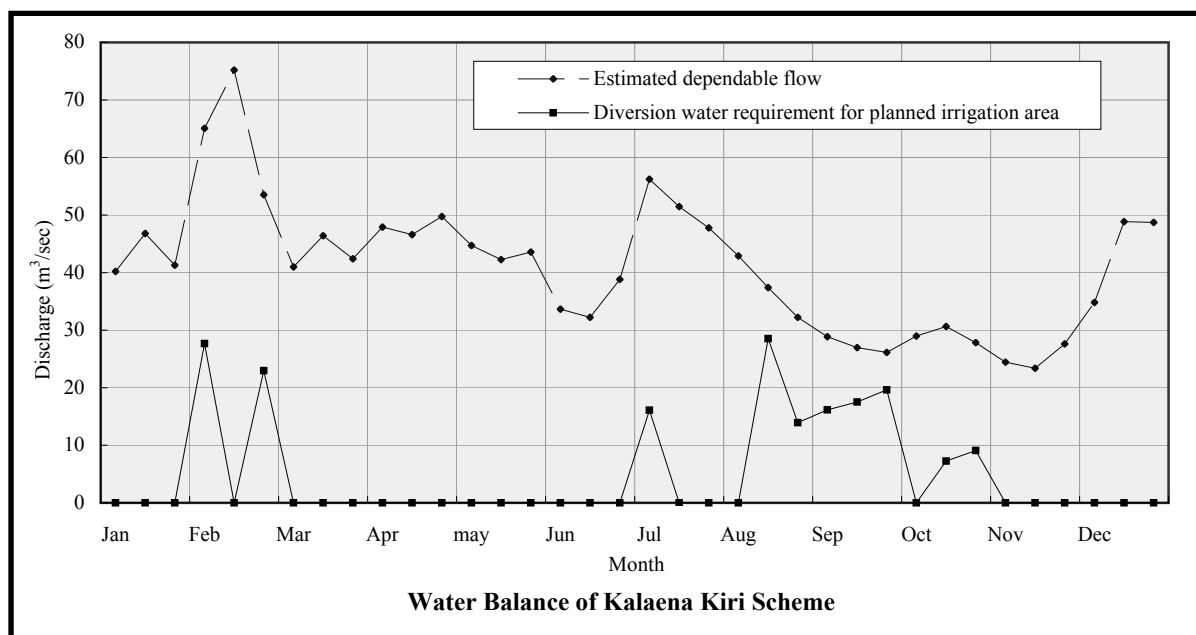


Table B-3.2.1 Rehabilitation Plan of Headworks

Structure	Condition	Problems
1. Weir, overflow weir	RG2	Repair by anti-wear concrete
2. Retaining wall, upstream	RG2	Repair by concrete
3. Retaining wall, downstream	RG3	Repair by concrete
4. Stilling basin	RG3	Repair by concrete
5. Inspection bridge	RG2	Repair by concrete
6. Scouring sluice	RG3	Repair by concrete
7. Intake	RG3	Removal of sediment and strengthening by concrete
8. Gates of intake and scouring sluice	RG3	Repair and greasing/painting to hoists and leaves
9. Upstream apron	RG3	Removal of sediment
10. Downstream river protection	RG3	Provision of concrete blocks and gabion
11. Settling basin	RG4	New construction near weir

Rehabilitation grade: RG 1: No rehabilitation

RG 2: Minor rehabilitation

RG 3: Large scale rehabilitation

RG 4: Replacement or new construction

Table B-3.2.2 Rehabilitation Plan of Main Canal and Inspection Road

HM	BK	Distance (m)	Condition of Canal (m)				Inspection Road * ¹
			RG1	RG2	RG3	RG4	
0	BP						
		1,519	750	400	369		RG2
15.19	BKKi 1						
		890	500	250	140		RG2
24.09	BKKi 2						
		1,073	500	250	323		RG2
34.82	BKKi 3						
		857	400	250	207		RG2
43.39	BKKi 4						
		650	350	150	150		RG2
49.89	BKKi 5						
		1,060	500	250	310		RG2
60.49	BKKi 6						
		1,666	800	400	466		RG2
77.15	BKKi 7						
		728				728	RG3
84.43	BKKi 8						
		692				692	RG3
91.35	BKKi 9						
		552				552	RG3
96.87	BKKi 10						
		706				706	RG3
103.93	BKKi 11						
		898				898	RG3
112.91	BKKi 12						
		1,221				1,221	RG3
125.12	BKKi 13						
		588				588	RG3
131	BKKi 14						
		793				793	RG3
138.93	BKKi 15						
		1,486				1,486	RG3
153.79	BKKi 16						
		2,093				2,093	RG3
174.72	BKKi 17						
		1,053				1,053	RG3
185.25	BKKi 18						
		462				462	RG3
189.87	BKKi 19						
Total			3,800	1,950	1,965	11,272	

*1: Rehabilitation grade

RG 1: No rehabilitation

RG 2: Minor rehabilitation

RG 3: Large scale rehabilitation

RG 4: Replacement or new construction

Table B-3.2.3 Rehabilitation Plan of Related Structure of Main Canal

Structure Serial No.	Structure	Hm	Name/Mark of Str.	Rehabilitation Grade *1
MC-1	Drainage CV	1.61	BK. Ki 1a	RG2
MC-2	Drainage CV	5.29	BK. Ki 1b	RG2
MC-3	Sand trap	6.18	BK.Ki 1c	RG1
MC-4	Measuring device	9.78	BK.Ki 1d	RG2
MC-5	Siphon	11.98	BK.Ki 1e	RG2
MC-6	Division Str.	15.19	BK. Ki 1	RG2
MC-7	Division Str.	24.09	BK. Ki 2	RG2
MC-8	Bridge	30.00	BK. Ki 3a	RG4 (New)
MC-9	Division Str.	34.82	BK. Ki 3	RG3
MC-10	Bridge	38.50	BK. Ki 4a	RG4 (New)
MC-11	Division Str.	43.39	BK. Ki 4	RG3
MC-12	Drainage CV	48.58	BK. Ki 5a	RG3
MC-13	Division Str.	49.89	BK. Ki 5	RG3
MC-14	Bridge	55.00	BK. Ki 6a	RG4 (New)
MC-15	Division Str.	60.49	BK. Ki 6	RG2
MC-16	Drop	63.28	BK. Ki 7a	RG3
MC-17	Drop	70.98	BK. Ki 7c	RG3
MC-18	Bridge	76.85	BK. Ki 7d	RG2
MC-19	Division Str.	77.15	BK. Ki 7	RG3
MC-20	Division Str.	84.43	BK. Ki 8	RG3
MC-21	Drainage CV	85.91	BK. Ki 9a	RG3
MC-22	Bridge	88.79	BK. Ki 9b	RG3
MC-23	Division Str.	91.35	BK. Ki 9	RG3
MC-24	Division Str.	96.87	BK. Ki 10	RG3
MC-25	Division Str.	103.93	BK. Ki 11	RG2
MC-26	Division Str.	112.91	BK. Ki 12	RG2
MC-27	Bridge	117.94	BK. Ki 13a	RG2
MC-28	Division Str.	125.12	BK. Ki 13	RG3
MC-29	Division Str.	131.00	BK. Ki 14	RG3
MC-30	Division Str.	138.93	BK. Ki 15	RG3
MC-31	Bridge	144.00	BK. Ki 16b	RG4 (New)
MC-32	Aqueduct	150.84	BK. Ki 16a	RG3
MC-33	Division Str.	153.79	BK. Ki 16	RG2
MC-34	Drop	157.35	BK. Ki 17a	RG3
MC-35	Bridge	166.00	BK. KI 7a-1	RG4 (New)
MC-36	Division Str.	174.72	BK. Ki 17	RG3
MC-37	Bridge	180.00	BK. Ki 18a	RG4 (New)
MC-38	Division Str.	185.25	BK. Ki 18	RG3
MC-39	Division Str.	189.87	BK. Ki 19	RG3

Rehabilitation grade *1

RG 1: No rehabilitation

RG 2: Minor rehabilitation

RG 3: Large scale rehabilitation

RG 4: Replacement or new construction

Table B-3.2.4 Canal Dimension of Main Canal

HM	BK	Length (m)	Design Discharge (m ³ /s)	Canal Bed Width (m)	Canal Height (m)	Lining Height (m)	Uniform Water Depth (m)	Side Slope (1:m)	Hydraulic Gradient 1/I
0.00									
		618	6.26	2.50	2.18	1.43	1.24	1.00	981
6.18									
		260	6.26	2.50	2.27	1.52	1.14	1.00	722
8.78									
		641	6.26	5.40	2.27	1.52	1.28	1.50	5,157
15.19	BK.Ki.1								
		889	5.75	3.50	1.95	1.20	1.03	1.50	1,324
24.09	Bk. Ki.2								
		1,073	5.57	2.80	1.87	1.12	0.92	1.50	643
34.82	BK. Ki.3								
		857	5.37	4.45	2.18	1.43	1.29	1.50	5,197
43.39	BK. Ki.4								
		651	5.28	3.50	1.93	1.18	1.07	1.50	1,791
49.89	BK.Ki.5								
		1,060	5.04	4.10	2.16	1.41	1.28	1.50	4,926
60.49	BK.Ki.6								
		1,666	4.80	4.00	2.13	1.38	1.16	1.50	3,609
77.15	BK.Ki.7								
		728	4.60	4.00	2.20	1.70	1.04	1.25	3,800
84.43	BK.Ki.8								
		692	4.37	4.00	2.10	1.60	0.98	1.25	3,500
91.35	BK.Ki.9								
		552	4.21	4.00	2.10	1.60	0.98	1.25	3,700
96.87	BK.Ki.10								
		706	3.90	3.60	2.10	1.60	0.96	1.25	3,300
103.93	BK.Ki.11								
		898	3.30	3.40	2.00	1.50	0.89	1.25	3,200
112.91	BK.Ki.12								
		1,221	3.21	3.40	2.00	1.50	0.89	1.25	3,400
125.12	BK.Ki.13								
		588	2.80	3.00	2.00	1.50	0.83	1.25	2,800
131.00	BK.Ki.14								
		793	2.43	2.80	1.90	1.40	0.83	1.25	3,300
138.93	BK.Ki.15								
		1,486	2.17	2.40	1.90	1.40	0.83	1.25	3,200
153.79	BK.Ki.16								
		2,093	1.88	2.20	1.90	1.40	0.80	1.25	3,200
174.72	BK.Ki.17								
		1,053	1.72	2.00	1.90	1.40	0.76	1.25	2,700
185.25	BK.Ki.18								
		462	1.59	2.00	1.90	1.40	0.78	1.25	3,400
189.87	BK.Ki.19								

Table B-3.2.5 Summary of Work Quantity for Rehabilitation

Work Description			Unit	Quantity	Work Description			Unit	Quantity	
I. Diversion Weir				III. Secondary Canal (9 nos. of SC)						
1.1	Rehabilitation of Weir				3.1	Secondary Canal, Canal Works				
1.1.1	Removal of sedimentation		m3	2,000	3.1.1	Excavation		m3	0	
1.1.2	Concrete works for bridge		m3	50	3.1.2	Excavation, existing canal		m3	64,000	
1.1.3	Pavement works for bridge		m3	50	3.1.3	Embankment, dike		m3	80,000	
1.1.4	Repair of overflow weir		m3	600	3.1.4	Embankment, inside		m3	64,000	
1.1.5	Concrete blocks		m3	1,200	3.1.5	Lining concrete		m3	7,500	
1.1.6	Gabion mattress		m3	3,400	3.1.6	Sod facing		m2	77,000	
1.1.7	Gate works		ton	6	3.2	Secondary Canal, Structure Works				
1.1.8	Concrete works for intake		m3	50	3.2.1	Excavation		m3	900	
1.1.9	Dewatering works		day	60	3.2.2	Embankment/backfill		m3	600	
	Settling Basin				3.2.3	Concrete		m3	300	
1.2	1.2.1	Excavation	m3	18,000	3.2.4	Form		m2	1,500	
	1.2.2	Backfill	m3	8,500	3.2.5	Reinforcement bars		ton	22	
	1.2.3	Concrete 18N	m3	1,000	3.2.6	Gate		ton	14	
	1.2.4	Concrete 13N	m3	60	3.3	Secondary Canal, Inspection Road				
	1.2.5	Reinforcement bars	ton	100	3.3.1	Preparatory works		m2	120,000	
	1.2.6	Form	m2	6,400	3.3.2	Gravel pavement		m3	12,000	
	1.2.7	Gate works	ton	5	3.3.3	Related facilities (10 % of above)		lot	1	
	1.2.8	Stoplog	ton	1	IV. Drainage Works				L.S	1
II. Main Canal Works				10 % of (II+III)						
2.1	Main Canal, Canal Works				V. On-Farm Development					
2.1.1	Excavation		m3	103,000	5.1	Irrigated Paddy Field		ha	2,791	
2.1.2	Excavation, existing canal		m3	56,000	5.2	Paddy field under rain fed condition		ha	1,246	
2.1.3	Embankment, dike		m3	94,000	VI. Project Facility					
2.1.4	Embankment, inside		m3	56,000	6.1	Gate keepers house		house	4	
2.1.5	Lining concrete		m3	8,500	6.2	Field cars		nos.	3	
2.1.6	Sod facing		m2	40,000	6.3	Motor cycle		nos.	20	
2.2	Main Canal, Structure Works				6.4	Office equipment		L.S	1	
2.2.1	Excavation		m3	4,200						
2.2.2	Embankment/backfill		m3	2,200						
2.2.3	Concrete		m3	1,300						
2.2.4	Form		m2	3,500						
2.2.5	Reinforcement bars		ton	90						
2.2.6	Gate		ton	22						
2.2.7	Metal works		ton	3						
2.3	Main Canal, Inspection Road									
2.3.1	Preparatory works		m2	115,000						
2.3.2	Gravel pavement		m3	12,000						
2.3.3	Related facilities (10% of above)		lot	1						

Table B-3.3.1 Agriculture Plan

(1/2)

1. Land Use Plan

Land Use Category	Present/Without Project		With Project		Increment (With-Without)	
	Area (ha)	(%)	Area (ha)	(%)	Area (ha)	(%)
Irrigated Paddy Field	2,375	58.8	4,037	100	1,662	41.2
Rainfed Paddy Field 1/	832	20.6	-		-832	-20.6
Cacao Planted Paddy Field 2/	830	20.6	-		-830	-20.6
Project Area	4,037	100.0	4,037	100	0	0
Tree Crop Land (alih fungsi) 1/	450	-	450	-	0	0
Original Potential Area	4,487	-	4,487	-	0	0

1/: Paddy field under rainfed condition in irrigation command area

2/: Cacao planted land converted from paddy field (command area of Polo 2ry Canal)

2. Planned Cropping Schedule & Pattern (illustrated in Fig. 3.3.1)

Wet Season: Paddy (100%) Beginning Jan. to Middle Feb. ~ Early Apr. to Middle May.

Dry Season I Palawija (10%) Maize (10%) -- Early April ~ Early July

Dry Season I Paddy (100%) Beginning July to Middle Aug. ~ Early Oct. to Middle Nov.

3. Planned Cropped Area & Cropping Intensity

Land Use Category/Crops	Wet Season		Dry Season I		Dry Season II		Annual	
	Area (ha)	Intensity (%)	Area (ha)	Intensity (%)	Area (ha)	Intensity (%)	Area (ha)	Intensity (%)
Present/Without Project								
Irrigated Paddy Field (2,791 ha)								
- Irrigated Paddy	2,375	85			2,375	85	4,750	170
- Cacao	416	15	-	-	-	-	416	15
Sub-total	2,791	100	0	0	2,375	85	5,166	185
Paddy Field under Rainfed Condition (1,246 ha)								
- Rainfed Paddy 1/	832	67					832	67
- Cacao	414	33	-	-	-	-	414	33
Sub-total	1,246	100	-	-	-	-	1,246	100
Overall Scheme (paddy field 4,037 ha)								
- Irrigated Paddy	2,375	59			2,375	59	4,750	118
- Rainfed Paddy	832	21					832	21
- Cacao	830	21	-	-	-	-	830	21
Total	4,037	100	0	0	2,375	59	6,412	159
With Project								
Irrigated Paddy Field (4,037 ha)								
- Irrigated Paddy	4,037	100			4,037	100	8,074	200
- Palawija (maize)			404	10			404	10
Total	4,037	100	404	10	4,037	100	8,478	210
Increment (With - Without)								
Overall Scheme (paddy field 4,037 ha)								
- Irrigated Paddy	1,662	41	0	0	1,662	41	3,324	82
- Palawija (maize)	0	0	404	10	0	0	404	10
- Rainfed Paddy	-832	-21	0	0	0	0	-832	-21
- Cacao	-830	-21	-	-	-	-	-830	-21
Total	0	0	404	10	1,662	41	2,066	51

1/: Paddy grown under rainfed conditions in irrigated fields

Table B-3.3.1 Agriculture Plan

(2/2)

4. Planned Crop Yield

Crop	Present/Without Project		With Project		Increment (t/ha)	
	Wet Season	Dry Season	Wet Season	Dry Season	Wet	Dry
Irrigated Paddy	4.0 t/ha	4.0 t/ha	5.0 t/ha	5.0 t/ha	1.0	1.0
Rainfed Paddy 1/	3.0 t/ha	-	-	-	-	-
Palawija (maize)	-	-	-	5.0 t/ha	-	-
Cacao 2/	0.6~1.7 t/ha		-	-	-	-

1/: Paddy grown under rainfed conditions in irrigated field 2/: Cacao yield under without project condition

5. Planned Crop Production

Crop	Present/Without Project (ton)			With Project (ton)			Increment Annual (ton)
	Wet Season	Dry Season	Annual	Wet Season	Dry Season	Annual	
Irrigated Paddy	9,500	9,500	19,000	20,185	20,185	40,370	21,370
Rainfed Paddy 1/	2,496		2,496			0	-2,496
Paddy Total	11,996	9,500	21,496	20,185	20,185	40,370	18,874
Palawija (maize)			0		2,020	2,020	2,020
Cacao			496~1,411			0	- 496~1,411

1/: Paddy grown under rainfed conditions in irrigated field 2/: Cacao production under without project condition

6. Extension Services Strengthening Plan

Major development constraints & extension services required for the earlier attainment of the project target.

Major Constraints for Agriculture Development:

- Farmers groups (KTs) yet to be empowered to a great extent,
- Insufficient extension services, insufficient capabilities of extension staffs especially in post-harvest & marketing aspects,
- Technical constraints; farmers in rainfed areas have limited experiences in irrigated farming etc.
- Shortage of hand tractors for future expansion of irrigated fields, and
- Participatory approaches for agriculture development yet to be introduced.

Extension Services Required:

- Institutional Strengthening Package Program
- Farmer Organizations Empowerment Package Program
- Technical Guidance Package Program
- Participation Enhancement Package Program

Implementation Plan of AESS (tentative)

Program	Implementation Schedule / Year				
	Construction Stage		Operation Stage		
	1st	2nd	3rd	4th	5th
Institutional Strengthening Package Program
Farmer Organizations Empowerment P. Program
Technical Guidance Package Program
Participation Enhancement Package Program

Table B-3.3.2 Comparison of Net Farm Return per Ha of Cacao and Double Cropping of Irrigated Paddy

1. Development Costs and Crop Budget of Cacao: Financial Price

		Year		1st Year	2nd Year	3rd Year	4th Year	5th Year	6th Year	7th Year	8th-11th Year	12th Year	13th Year	14th-15th Year	16th-18th Year	19th-20th Year	21st Year	22nd Year	23rd Year ~																
1. Production in Upland Field (t)						0.60	0.90	1.20	1.40	1.60	1.70	1.60	1.50	1.40	1.30	1.20	1.10	1.00	0.70																
2. Production at Paddy Field (t): (1 x 0.80) 1/						0.48	0.72	0.96	1.12	1.28	1.36	1.28	1.20	1.12	1.04	0.96	0.88	0.80	0.56																
3. Unit Price (Rp.000)						9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5																
4. Gross Return (Rp. million)						4,560	6,840	9,120	10,640	12,160	12,920	12,160	11,400	10,640	9,880	9,120	8,360	7,600	5,320																
Development/Farming Costs	Unit	Unit Price (Rp.000)	Q'ty	Amount (Rp.000)	Q'ty	Amount (Rp.000)	Q'ty	Amount (Rp.000)	Q'ty	Amount (Rp.000)	Q'ty	Amount (Rp.000)	Q'ty	Amount (Rp.000)	Q'ty	Amount (Rp.000)	Q'ty	Amount (Rp.000)	Q'ty	Amount (Rp.000)	Q'ty	Amount (Rp.000)	Q'ty	Amount (Rp.000)	Q'ty	Amount (Rp.000)	Q'ty	Amount (Rp.000)	Q'ty	Amount (Rp.000)	Q'ty	Amount (Rp.000)	Q'ty	Amount (Rp.000)	
1 Materials/Farm Inputs				6,095	1,500	2,325	2,325	2,325	2,325	2,325	2,325	2,325	2,325	2,325	2,325	2,325	2,325	2,325	2,325	2,325	2,325	2,325	2,325	2,325	2,325	2,325	2,325	2,325	2,325	2,325	2,325	2,325	2,325		
Seedling	trees	1.5	1,200	1,800																															
Sticks	stick	0.5	1,100	550																															
String for Sticking	m	0.5	220	110																															
Sticks for Shadow Trees	stick	0.6	600	360																															
NPK Fertilizers	kg	2.5	110	275	220	550	550	1,375	550	1,375	550	1,375	550	1,375	550	1,375	550	1,375	550	1,375	550	1,375	550	1,375	550	1,375	550	1,375	550	1,375	550	1,375	550	1,375	
Seeds of Shadow Trees	kg	25.0	20	500																															
Permanent Shadow Trees	stick	1.0	600	600																															
Agro-chemical	l	95.0	20	1,900	10	950	10	950	10	950	10	950	10	950	10	950	10	950	10	950	10	950	10	950	10	950	10	950	10	950	10	950	10	950	
2 Equipment				2,250		820	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	
Sprayer	unit	400	2	800																															
Mattock	unit	40	5	200		1	40																												
Fork	unit	40	5	200		2	80																												
Pruning Knife	unit	75	5	375		2	150																												
Plastic Pail	unit	10	5	50		5	50																												
Gembor	unit	40	5	200																															
Grass Cutter	unit	40	2	80		2	80																												
Saw	unit	30	5	150		5	150																												
Waste Cloth	unit	10	2	20		2	20																												
Knife	unit	25	5	125		5	125	5	125	5	125	5	125	5	125	5	125	5	125	5	125	5	125	5	125	5	125	5	125	5	125	5	125	5	125
Bracket	unit	10	5	50		5	50																												
Tikar	unit	15				5	75																												
3 Labor				2,970	900	1,710	1,515	1,785	1,950	2,130	2,220	2,130	2,040	1,950	1,860	1,785	1,695	1,605	1,350																
3.1 Development				1,830																															
Family Labor	mandays		285																																
Hired Labor	mandays	15	122	1,830																															
Total	mandays		407	1,830																															
3.2 Farm Operation Management				1,140	900	1,710	1,515	1,785	1,950	2,130	2,220	2,130	2,040	1,950	1,860	1,785	1,695	1,605	1,350																
- Family Labor	mandays		178	139	186																														
- Hired Labor	mandays	15	76	1,140	60	900	79	1,185	49	735	49	735	49	735	49	735	49	735	49	735															
- Total	mandays		254	1,140	199	900	265	1,185	49	735	49	735	49	735	49	735	49	735	49	735															
Harvesting																																			
- Family Labor	mandays																																		
- Hired Labor	mandays	15			35	525	52	780	70	1,050	81	1,215	93	1,395	99	1,485	93	1,395	87	1,305															
- Total	mandays		0	0	0	35	525	52	780	70	1,050	81	1,215	93	1,395	99	1,485	93	1,395	87	1,305														
Overall																																			
- Family Labor	mandays		178	139	186	0	0	0	0	0	0	0	0	0	0	0	0	0	0																
- Hired Labor	mandays	15	76	1,140	60	900	114	1,710	101	1,515	119	1,785	130	1,950	142	2,130	148	2,220	142	2,130															
- Total	mandays		254	1,140	199	900	300	1,710	101	1,515	119	1,785	130	1,950	142	2,130	148	2,220	142	2,130															
4 Miscellaneous Costs 1/	(Rp.000)			566	120	486	397	424	440	458	467	458	449	440	431	424	415	406	380																
Total Costs (Rp.000)	(Rp.000)			11,881	2,520	5,341	4,362	4,659	4,840	5,038	5,137	5,038	4,939	4,840	4,741	4,659	4,560	4,461	4,180																
Net Return (Rp.000)	(Rp.000)			-11,881	-2,520	-781	2,479	4,462	5,800	7,122	7,783	7,122	6,461	5,800	5,139	4,462	3,801	3,140	1,140																
	(%)																																		

1/: Cacao yield in paddy field assumed to be 80% of yield in upland field because production likely to be adversely affected by impeded drainage condition in areas located close to or surrounded with irrigated paddy 2/: 1st to 2nd year = (1 + 2 + 3) x 5%; from 3rd year = (1 + 2 + 3) x 10%
Source: Prepared based on material provided by Dinas Perkebunan, Propinsi Sulawesi Selatan

2. Comparison of Net Returns per Ha

A. Average Net Return per Ha from Cacao for 20 years (from 4th year to 23rd year) --Rp. 91,506,000 ÷ 20 = Rp. 4,780,000/year

Balance: B - A = Rp. 3,460,000/year: on average annual net return of Rp. million 3.5 is higher in case of double cropping of paddy

B. Annual Net Return from Double Cropping of Irrigated Paddy -----Rp. 4,120,000/season x 2 seasons = Rp. 8,240,000/year (Ref. Table B-3.3.3)

Table B-3.3.3 Financial Crop Budget per Ha under With Project: Kalaena Kiri

Items	Unit	Unit Price (Rp. 000)	Irrigated Paddy				Maize (hybrid)	
			Wet Season		Dry Season		Dry Season	
			Q'ty	Value (Rp. 000)	Q'ty	Value (Rp. 000)	Q'ty	Value (Rp. 000)
1. Gross Return								
Unit Yield	(t/ha)		5.0		5.0		5.0	
Unit Price	(Rp.000/t)			1,300		1,300		1,000
Gross Return	(Rp.000)			6,500		6,500		5,000
2. Production cost				2,377		2,377		2,181
2-1. Farm Inputs				759		759		1,073
Seed 1/	(kg)		30	96	30	96	20	420
Fertilizers				570		570		500
- Urea	(kg)	1.3	200	260	200	260	200	260
- SP36	(kg)	1.8	75	135	75	135	75	135
- KCl	(kg)	2.1	50	105	50	105	50	105
- ZA	(kg)	1.4	50	70	50	70		
Agro chemicals				93		93		153
- Insecticide (liquid)	(lit)	50	1.5	75	1.5	75	1.5	75
- Insecticide (powder)	(kg)	30						
- Rodenticide	(kg)	35	0.5	18	0.5	18	0.5	18
- Herbicide	(kg)	30					2.0	60
2-2. Labor Costs				1,025		1,025		555
Contracted Works								
- Transplanting 2/	(unit)		1	300	1	300		
- Harvesting 3/	(unit)		10 %	650	10 %	650	9 %	450
Labor Requirements 4/								
- Hired Labor	(man-day)	15	5	75	5	75	7	105
- Family Labor	(man-day)		48		48		63	
Total	(man-day)		53		53		70	
2-3. Land Preparation				350		350		0
- Machinery	(unit)		1	350	1	350		
- Draft Animal	(unit)							
2-4. Field Transportation	(L.S.)		2 %	130	2 %	130	2 %	100
2-5. Shelling	(L.S.)							350
2-6. Miscellaneous Expenses	(L.S.)		5 %	113	5 %	113	5 %	104
3. Net Return				4,123		4,123		2,819
	Rp. 000			4,123		4,123		2,819
	%			63		63		56
	Rounded			4,120		4,120		2,820

1/: Paddy seed price: Irrigated field --- yield level < 5.0 Rp. 2,000/kg; yield level ≥ 5.0 Rp. 3,200/kg; maize Rp.21,000/kg

2/: Contract work for transplanting assumed --- Rp. 300,000/ha at financial price by 15 laborers

3/: Share harvesting (brogan) system assumed; cost -- paddy 10 % of products; maize 9 % of products

4/: Hired Labor Requirements --- assumed to be 10% of total labor requirements in irrigated field

TableB-3.3.4 (1/8): Program Description Sheet: Institutional Strengthening Package Program

<p>1. Establishment of Task Force Team for Agriculture Extension Services Strengthening (AESS)</p> <p>1-1. Regional (province or district) Task Force Team</p> <p>1) Program Objectives and Description</p> <p>The formation of "Task Force Team" at a regional level is proposed in order to ensure the establishment of a standing institution responsible for the planning, implementation and monitoring of AESS.</p> <p>2) Task Force Team Members</p> <p>Proposed members of Task Force Team are:</p> <p>Chief: Chief of Food Crops Agriculture Services Office Secretary: Food Crops Agriculture Services Office Members: Planning agencies (BAPPEDA etc.) Technical agencies (Food Crops, Irrigation etc.) Marketing agencies Adhoc members on need basis Technical guidance members (provincial technical agencies)</p> <p>3) Job Description of Task Force Team</p> <ul style="list-style-type: none"> - Formulation of implementation program of AESS - Preparation of annual work programs for AESS - Preparation of budget proposal for the annual work program - Monitoring & evaluation of AESS - Guidance, support & supervision of Sub-regional Task Force Teams <p>4) Organizational Set-up and Authority</p> <p>The Task Force Team should better be organized as a development institution directly responsible to regional governor. The Team should better be given the entire authority on AESS under the governor.</p> <p>5) Estimated Program Cost</p> <p>The costs for the program should better be accommodated in the regional administration budget.</p>
<p>1-2. Sub-regional (district or sub-district) Task Force Team</p> <p>1) Program Objectives and Description</p> <p>The formation of "Task Force Team" at a sub-regional level is planned in order to ensure the establishment of a standing institution responsible for the planning, implementation and monitoring of</p> <p>2) Task Force Team Members</p> <p>Proposed members of Task Force Team are:</p> <p>Chief: Chief of Food Crops Agriculture Services Sub-regional Office Secretary: Local government staff Members: Planning agencies Technical agencies (Food Crops, Irrigation etc.) Marketing agencies Adhoc members on need basis Technical guidance members (regional technical agencies)</p> <p>3) Job Description of Task Force Team</p> <ul style="list-style-type: none"> - Preparation of proposal for an sub-regional annual work program for AESS through participatory approaches of beneficiaries. - Monitoring & evaluation of AESS <p>4) Organizational Set-up and Authority</p> <p>The Task Force Team should better be organized as an institution directly responsible to Regional Task Force Team . The Team should better be given the entire authority on AESS at sub-regional level.</p> <p>5) Estimated Program Cost</p> <p>The costs for the program should better be accommodated in the regional or sub-regional administration</p>

Table B-3.3.4 (2/8): Program Description Sheet: Institutional Strengthening Package Program

2. Staff Empowerment Program	
2-1. Regional (province or district) Staff Empowerment Sub-program	
1) Program Objectives The program aims at empowerment of regional level staffs of agencies concerned with AESS through provision of periodical and specific staff empowerment programs.	
2) Program Description and Subjects The periodical empowerment program is for: 1) seasonal & annual planning and review of AESS at regional level participated by staffs concerned of province & district and representatives of sub-districts and 2) general empowerment program of district staffs concerned. The special staff empowerment program is for: 1) empowerment of staffs on specific subjects such as marketing, partnership promotion, products processing, institutional strengthening etc. through training, workshop & seminar, 2) empowerment of Regional Task Force Teams members organized under AESS and 3) empowerment of staffs on specific subjects through field activities including OJT and study tour.	
3) Target Groups Periodical Empowerment Program: - Province & district staffs concerned with AESS - Representatives of sub-districts Special Empowerment Program: - District staffs concerned with the selected subjects & Regional Task Force Teams members organized under AESS	
4) Program Requirements and Timing Periodical Empowerment Program: 2 programs per year (seasonal) in principle Special Empowerment Program: On need basis (intensive implementation required in the initial stage) - Periodical program should be after the same in the sub-regional level	
5) Estimated Program Cost Periodical Empowerment Program: Rp. 5,000,000/program Special Empowerment Program: Rp. 5,000,000/program & Rp. 10,000,000/program (field activities)	
2-2. Agriculture & Extension Staff (Sub-regional Staff) Empowerment Sub-program	
1) Program Objectives The program aims at empowerment of sub-regional level staffs (district or sub-district) of agencies concerned with AESS through provision of periodical and specific staff empowerment programs.	
2) Program Description and Subjects The periodical empowerment program is for: 1) seasonal & annual planning and review of AESS at sub-regional level participated by staffs concerned of sub-regions and representatives of producers and 2) general empowerment program of sub-regional staffs concerned. The special staff empowerment program is for: 1) empowerment of staffs on specific subjects through training, workshop & seminar, 2) empowerment of Sub-regional Task Force Teams members organized under AESS and 3) empowerment of staffs on specific subjects through field activities including OJT and study tour.	
3) Target Groups Periodical Empowerment Program: - Sub-regional staffs concerned with AESS - Representatives of farmers/producers Special Empowerment Program: - Sub-regional staffs concerned with the selected subjects & Sub-regional Task Force Teams members organized under AESS.	
4) Program Requirements and Timing Periodical Empowerment Program: 2 programs per year (seasonal) in principle Special Empowerment Program: On need basis (intensive implementation required in the initial stage) - Periodical program should be prior to the same in the regional level	
5) Estimated Program Cost Periodical Empowerment Program: Rp. 5,000,000/program Special Empowerment Program: Rp. 5,000,000/program & Rp. 10,000,000/program (field activities)	
3. Strengthening of Extension Facilities	
3-1. Program Objectives The program aims to strengthening agricultural extension facilities of the 2 project sub-districts through:	
3-2. Estimated Program Cost	
Extension Equipment & facilities	Rp. 10 million/unit x 2 units = Rp. 20 million
Motorcycle	Rp. 15 million/unit x 2 units = Rp. 30 million
Total	Rp. million 50.-

Table B-3.3.4 (3/8): Program Description Sheet: Farmer Organization Empowerment Package Program

4. Agri-business Promotion Package Program	
4-1.	<p>Program Background and Objectives</p> <p>Agri-business development appears to be a key word selected as a direction or strategy for agriculture development in Indonesia. It should be area specific ones and promoted through a business minded manner based on cooperation and collaboration with private sectors. For the promotion of such a development strategy, collaborative studies of stakeholders on the subject will be essential.</p> <p>The objective of the program is, therefore, to introduce the agri-business oriented agriculture development in the Area. Conceived activities required for the attainment of the objective are formulated as a package program.</p>
4-2.	<p>Program Activities</p> <p>The package programs will consist of: 1) the 1st phase program--- establishment of task force team, potential study, capacity building of staffs concerned and socialization programs for producers and interested groups (partner candidates) and 2) the 2nd phase program --- formation of agri-business groups, technical, managerial & institutional capacity building of producers groups, promotion of formation of partnership, pilot operation.</p>
4-3.	<p>1st Phase Program</p> <p>4-3-1. Program Target</p> <p>The 1st phase is the preparatory stage for the promotion of agri-business oriented agriculture.</p> <p>4-3-2. Program descriptions</p> <p>(1) Establishment of Task Force Team</p> <p style="padding-left: 20px;"><u>Formation of Task Force Team</u></p> <p style="padding-left: 40px;">Task: Responsible for agri-business promotion in a district Chief: Chief of Food Crops Agriculture Services Office Member: Food Crops Agriculture Services Office BAPPEDA Agricultural Information Center/Office (if any) Other agencies concerned (Cooperative Services Office etc.) Chief of sub-district agriculture services office Technical guidance members (provincial technical agencies)</p> <p style="padding-left: 40px;">Secretary: Food Crops Agriculture Services Office</p> <p style="padding-left: 20px;"><u>Empowerment of Task Force Team</u></p> <ul style="list-style-type: none">- Induction training of members under Staff Empowerment Program- Official establishment of Task Force Team by District Governor <p style="padding-left: 20px;"><u>1st Collaboration Workshop at District Level</u></p> <ul style="list-style-type: none">- Workshop of stake holders chaired by Task Force Team- Establishment of basic approaches for agri-business promotion by Task Force Team <p style="padding-left: 40px;">Establishing scope of the potential study</p> <p style="padding-left: 40px;">Participants: Task force Team, sub-district agriculture services offices, farmer groups</p> <p>(2) Potential Study</p> <ul style="list-style-type: none">- Field survey & data collection- Study tour- Identification of constraints & potential- 2nd Collaboration Workshop at district level- Establishing approaches for partnership promotion (draft) <p>(3) District & Sub-district Staff Capacity Building</p> <ul style="list-style-type: none">- Training program- Study tour- 3rd Collaboration Workshop at district level- Establishing approaches for partnership promotion (final) <p>(4) Socialization Program</p> <ul style="list-style-type: none">- 1st Workshop at Sub-district Level- Continuous guidance by extension staffs & Task Force Team <p>(5) Performance Evaluation</p> <p style="padding-left: 40px;">Performance evaluation of 1st phase activities by Task Force Team and stakeholders.</p>

Table B-3.3.4 (4/8): Program Description Sheet: Farmer Organization Empowerment Package Program

4-4.	2nd Phase Programs																																																																																
4-4-1.	<p>Program Target</p> <p>The 2nd phase is the pilot operation of the promotion of agri-business oriented agriculture.</p>																																																																																
4-4-2.	<p>Program descriptions</p> <p>(1) Selection/Formation of Agri-business Farmers Groups</p> <p>Selection or formation of farmer groups participating in the agri-business promotion program. Initially, advanced farmer groups in irrigated areas to be selected as target groups.</p> <p>(2) Technical, Managerial & Institutional Capacity Building of Groups</p> <ul style="list-style-type: none"> - Training program - Study tour/Field school - Workshop on agri-business oriented foods crops production and determination on farming practices (from seed selection to post-harvest treatment) and marketing practices to be employed by the target farmers groups <p>(3) Partnership Formation Promotion</p> <p>In case of need, the partnership formation is to be introduced.</p> <p>(4) Pilot Operation</p> <p>Implementation of agri-business oriented food crops production by target groups in accordance with the practices agreed in the workshop.</p> <p>(5) Performance Evaluation</p> <p>Performance evaluation of 2nd phase activities, especially results of pilot operations by Task Force Team and stakeholders.</p>																																																																																
4-5.	<p>Program Requirements and Implementation</p> <ul style="list-style-type: none"> - In total of 2 packets in 2 years covering 10 KT's are tentatively proposed.. - The 1st and 2nd phase to be completed within a year. 																																																																																
4-6.	<p>Estimated Program Cost</p> <p>Roughly estimated program costs are as follows;</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 45%;">Item</th> <th style="width: 25%;">Estimated Cost (Rp.000)</th> <th style="width: 30%;">Remarks</th> </tr> </thead> <tbody> <tr> <td>1. 1st Phase Program</td> <td></td> <td>per 5 KT's</td> </tr> <tr> <td>1) Establishment of Task Force Team</td> <td style="text-align: center;">-</td> <td rowspan="2">Administrative budget</td> </tr> <tr> <td> Empowerment of Task Force Team</td> <td style="text-align: center;">-</td> </tr> <tr> <td> 1st Collaboration Workshop</td> <td style="text-align: center;">-</td> <td></td> </tr> <tr> <td>2) Potential Study</td> <td style="text-align: right;">18,000</td> <td></td> </tr> <tr> <td> Field survey</td> <td style="text-align: right;">5,000</td> <td></td> </tr> <tr> <td> Study tour</td> <td style="text-align: right;">10,000</td> <td></td> </tr> <tr> <td> 2nd Collaboration Workshop</td> <td style="text-align: right;">3,000</td> <td></td> </tr> <tr> <td>3) District & Sub-district Staff Capacity Building</td> <td style="text-align: right;">18,000</td> <td></td> </tr> <tr> <td> Training program</td> <td style="text-align: right;">5,000</td> <td></td> </tr> <tr> <td> Study tour</td> <td style="text-align: right;">10,000</td> <td></td> </tr> <tr> <td> 3rd Collaboration Workshop</td> <td style="text-align: right;">3,000</td> <td></td> </tr> <tr> <td>4) Socialization Program</td> <td style="text-align: right;">1,000</td> <td></td> </tr> <tr> <td> 1st Workshop at Sub-district</td> <td style="text-align: right;">1,000</td> <td></td> </tr> <tr> <td>5) Administrative & miscellaneous cost</td> <td style="text-align: right;">2,000</td> <td>≅ 5 % of 2) to 4)</td> </tr> <tr> <td style="text-align: right;">Sub-total</td> <td style="text-align: right;">39,000</td> <td></td> </tr> <tr> <td>2. 2nd Phase Program</td> <td></td> <td>per 5 KT's</td> </tr> <tr> <td>1) Formation of Farmers Groups</td> <td style="text-align: right;">1,000</td> <td></td> </tr> <tr> <td>2) Capacity Building of Groups</td> <td style="text-align: right;">16,000</td> <td></td> </tr> <tr> <td> Training program</td> <td style="text-align: right;">5,000</td> <td></td> </tr> <tr> <td> Study tour/field school</td> <td style="text-align: right;">10,000</td> <td></td> </tr> <tr> <td> Workshop at sub-district</td> <td style="text-align: right;">1,000</td> <td></td> </tr> <tr> <td>3) Partnership Formation Promotion</td> <td style="text-align: right;">1,000</td> <td></td> </tr> <tr> <td>4) Administrative & miscellaneous cost</td> <td style="text-align: right;">1,000</td> <td>≅ 5 % of 1) to 3)</td> </tr> <tr> <td style="text-align: right;">Sub-total</td> <td style="text-align: right;">19,000</td> <td></td> </tr> <tr> <td style="text-align: right;">Estimated Program Cost Total</td> <td style="text-align: right;">58,000</td> <td></td> </tr> </tbody> </table>	Item	Estimated Cost (Rp.000)	Remarks	1. 1st Phase Program		per 5 KT's	1) Establishment of Task Force Team	-	Administrative budget	Empowerment of Task Force Team	-	1st Collaboration Workshop	-		2) Potential Study	18,000		Field survey	5,000		Study tour	10,000		2nd Collaboration Workshop	3,000		3) District & Sub-district Staff Capacity Building	18,000		Training program	5,000		Study tour	10,000		3rd Collaboration Workshop	3,000		4) Socialization Program	1,000		1st Workshop at Sub-district	1,000		5) Administrative & miscellaneous cost	2,000	≅ 5 % of 2) to 4)	Sub-total	39,000		2. 2nd Phase Program		per 5 KT's	1) Formation of Farmers Groups	1,000		2) Capacity Building of Groups	16,000		Training program	5,000		Study tour/field school	10,000		Workshop at sub-district	1,000		3) Partnership Formation Promotion	1,000		4) Administrative & miscellaneous cost	1,000	≅ 5 % of 1) to 3)	Sub-total	19,000		Estimated Program Cost Total	58,000	
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Table B-3.3.4 (5/8): Program Description Sheet: Farmer Organizations Empowerment Package Program

5. Kelompok Tani Empowerment Sub-program	
5-1. Program Background	<p>The primary constraint for the introduction of business oriented agriculture activities in the project area appears to be capabilities of individual farmers and farmers groups toward the same. While, the decentralization policy as well as the economic development policy of Indonesia will bring in privatization of agriculture including agriculture support activities currently being undertaken by the government. This dictates the necessity of the establishment of producers groups (better be called so rather than farmers groups) who are well organized and are technically capable, business minded and market oriented legal bodies.</p>
5-2. Program Objectives	<p>The program challenges against a long lasting and envisaged theme of the Indonesian agriculture to establish and strengthening of farmers group (<i>Kelompok Tani</i>). Therefore, the program aims to establish units of "Producers & Marketing Group (P&MG)".</p> <p>Major activities of P&MG will include group purchase of farm inputs and group marketing of products.</p>
5-3. Program Activities and Descriptions	<p>The activities (program components) involved in this program are:</p> <ul style="list-style-type: none">- Establishment of Farmer Groups Empowerment Task Force Team (FGE TFT)- Inventory on agricultural farmer groups- Selection of target areas & groups- Socialization of programs & workshops- Implementation of empowerment programs- Formation of new organization, "producers & marketing groups"- Monitoring & evaluation
5-4. Program Descriptions	<p>The descriptions of individual activities (program components) are as follows;</p>
5-4-1. Establishment of Farmer Groups Empowerment Task Force Team (FGE TFT)	<p><u>Formation of Task Force Team</u></p> <p>Task: Responsible for KT & UPJA Empowerment Program in a district Chief: Chief of Agriculture Services Office Member: Agricultural technical agencies Chief of sub-district agriculture services office Secretary: Agriculture Services Office or Agriculture Extension Information Center</p> <p><u>Empowerment of Task Force Team</u></p> <ul style="list-style-type: none">- Induction training of members under Staff Empowerment Program- Official establishment of Task Force Team by District Governor
5-4-2. Inventory on Agricultural Farmer Groups (<i>Kelompok Tani</i> /KT)	<ul style="list-style-type: none">- Inventory on KTs formed by sub-district- Identification of area covered, membership, activities, financial status, constraints, future plans etc.
5-4-3. Selection of Target Areas & KTs	<p>Selection of target areas & KTs for further programs by sub-district</p>

Table B-3.3.4 (6/8): Program Description Sheet: Farmer Organizations Empowerment Package Program

5-4-4. Socialization of Programs & Workshops

1st Workshop at Sub-district Level

- Socialization of programs
- Preliminary identification of constraints, needs, future plans or aspirations of KTs
- Workshop for preparation of preliminary action plans

Workshop at KT Level

- Socialization of programs
- Identification of constraints, needs, future plans or aspirations of KTs
- Workshop for preparation of action plans by KT

2nd Workshop at Sub-district Level

- Identification of constraints, needs, future plans or aspirations of KTs
- Workshop for preparation of action plans by sub-district

5-4-5. Implementation of Empowerment Programs

Support activities in the empowerment programs include;

- Training program on technical, marketing, managerial & institutional issues
- Study tour to advanced groups, marketing places, processing factories etc.
- Partnership promotion
- Follow-up & continuous guidance by extension staffs and Task Force Team members

5-4-6. Formation of New Organization, "Producers & Marketing Groups (P&MG)"

- Formation of new organizations by farmers supported by extension staffs & Task Force Team
- Legalization of new organizations by preparing by-laws and with registration by district governor
- Major activities of P&MG will include group purchase of farm inputs and group marketing of products.

5-4-7. Monitoring & Evaluation

Monitoring & evaluation by P&MGs themselves supported by extension staffs.

5-5. Approaches for Program Implementation and Selection of Target Areas & KTs

At the initial stage, the selection of existing progressive KTs in the scheme are suggested.

5-6. Program Volumes

Program volumes per year depends on the capability of Task Force Team and staffs concerned with.

5-7. Estimated Program Cost

Roughly estimated program costs are as follows;

Item	Estimated Cost (Rp.000)		Remarks
1. Establishment of FGE TFT		3,000	per district
Empowerment of Task Force Team	3,000		
2. Inventory on agricultural farmer groups		2,000	per sub-district
3. Socialization of programs & workshops		4,500	per sub-district
1st Workshop at Sub-district Level	2,000		
Workshop at KT Level	1,000		per sub-district
2nd Workshop at Sub-district Level	1,500		
4. Implementation of empowerment programs		10,000	per sub-district
Training program	3,000		
Study Tour	5,000		
Partnership promotion	2,000		
5. Formation of new organization		2,000	per sub-district
6. Administrative & miscellaneous cost		1,000	≅ 5 % of 1 to 5
Estimated Program Cost		22,500	

Table B-3.3.4(7/8): Program Description Sheet: Farmer Organizations Empowerment Package Program

6. UPJA Formation Sub-program		
6-1. Program Background and Objectives		
<p>In the project area, land preparation works for food crop production are mostly carried out by using hand tractor under hiring service arrangement. UPJA (Farm Machinery Hiring Services Farmer Group) system was introduced under SPL OECF in the province. UPJAs are providing hiring services of hand tractor, power thresher, RMU, water pump and drier. With the expansion of irrigated paddy field under the rehabilitation plan, the number of UPJAs in and around the project area is extremely limited and the expansion of UPJA services is considered inevitable to provide hiring services to farming community.</p>		
6-2. Program Descriptions		
6-2-1. Review of Current UPJA System		
<p>The review of current UPJA system and improvement of the system, if deemed necessary, is considered essential under the province and district joint workshop as follows;</p> <ul style="list-style-type: none"> - Inventory on UPJA performances and review of current UPJA system by individual districts - Workshop for joint review of UPJA system by province and district: <ul style="list-style-type: none"> - Participated by Provincial & District Food Crops Agriculture Services Offices - Formulation of draft standard UPJA system by provincial agencies - Formulation of standard UPJA system by provincial agencies - Workshop with UPJAs at district level - Formulation of updated UPJA system by individual district agencies 		
6-2-2. UPJA Formation Program		
<ul style="list-style-type: none"> - Formation of UPJA farmer groups - Training program to UPJA management staffs on the updated system, management, planning, accounting, institutional issues, monitoring requirements etc. - Provision of farm machinery (hand tractor 1 unit; power thresher 1 unit; trailer 1 unit per UPJA) 		
6-2-3. Operator & Mechanic Training		
<p>Training of operators & mechanic on O&M and service discipline etc.</p>		
6-2-4. Monitoring & Evaluation		
<ul style="list-style-type: none"> - Monitoring & evaluation of the program by district and extension staffs - Monitoring & evaluation of UPJA activities to be done by UPJA themselves 		
6-3. Approaches for Program Implementation and Selection of Target UPJAs		
<ul style="list-style-type: none"> - The initial step is the province & district joint review of current UPJA system and the review of current system followed at individual district level. - All the existing UPJAs to be supported with this program, and new-coming UPJAs if possible. - Operator and mechanic refresher training to be held annually at district level, depending needs basis. 		
6-4. Program Volumes		
<p>Formation of 18 UPJAs in 3 years are tentatively assumed.</p>		
6-5. Estimated Program Cost		
<p>Roughly estimated program costs are as follows;</p>		
Item	Estimated Cost (Rp.000)	Remarks
1. UPJA Formation Sub-program		per sub-district
(1) Review of Current UPJA System	-	Administrative budget
(2) Formation of UPJA farmer groups	2,000	
(3) UPJA formation training program	5,000	
(4) Operator & Mechanic Training	5,000	
(5) Provision of farm machinery	65,000	
(6) Administrative & miscellaneous cost	4,000	≅ 5 % of (2) to (5)
Estimated Program Cost	81,000	

Table B-3.3.4 (8/8): Program Description Sheet: Technical Guidance & Participation Enhancement Package Program

7. Technical Guidance Package Program													
7-1.	Candidate Programs												
7-1-1.	Field Extension Sub-program												
(1)	Program Objectives & Description												
	Verification/simple trial To verify or make simple trial on adaptability of recommended varieties & farming practices												
	Field demonstration Demonstration of area specific farming technologies & on-farm water management for paddy & palawija at different scale												
	IPM To adopt agronomic/biological control method of pests & diseases with appropriate use of chemicals through establishing field schools at 3ry unit level												
(2)	Estimated Unit Program Costs (Rp. 000)												
	<table border="1"> <tr> <td>Verification or simple trial</td> <td>10,000 per unit</td> <td>Demonstration area</td> <td>20,000 per unit</td> </tr> <tr> <td>Demonstration plot</td> <td>3,000 per unit</td> <td>Cropping pattern demonstration</td> <td>20,000 per unit</td> </tr> <tr> <td>Demonstration farm</td> <td>10,000 per unit</td> <td>IPM</td> <td>15,000 per unit</td> </tr> </table>	Verification or simple trial	10,000 per unit	Demonstration area	20,000 per unit	Demonstration plot	3,000 per unit	Cropping pattern demonstration	20,000 per unit	Demonstration farm	10,000 per unit	IPM	15,000 per unit
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Demonstration plot	3,000 per unit	Cropping pattern demonstration	20,000 per unit										
Demonstration farm	10,000 per unit	IPM	15,000 per unit										
7-1-2.	Farmer Training Sub-program												
(1)	Programs												
	<ul style="list-style-type: none"> - Farmer/farmer group training - Mass guidance/campaign/ workshop - Farmer groups formation/ activation guidance - Integrated farmer group formation guidance 												
(2)	Estimated Program Costs (Rp. 000)												
	<table border="1"> <tr> <td>Farmer/farmer group training</td> <td>10,000 per unit</td> <td>Farmer groups formation</td> <td>7,500 per unit</td> </tr> <tr> <td>Integrated farmer group formatic</td> <td>15,000 per unit</td> <td>Mass guidance/workshop</td> <td>3,000 per unit</td> </tr> </table>	Farmer/farmer group training	10,000 per unit	Farmer groups formation	7,500 per unit	Integrated farmer group formatic	15,000 per unit	Mass guidance/workshop	3,000 per unit				
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7-1-3.	Farmer-to Farmer Training Sub-program												
(1)	Programs												
	<ul style="list-style-type: none"> - Field school on farm or water management - Field school on agri-business approaches - Study tour 												
(2)	Estimated Program Costs (Rp. 000)												
	<table border="1"> <tr> <td>Field school on farm/water management</td> <td>10,000 per unit</td> <td>Study tour</td> <td>10,000 ~ 26,000 per unit</td> </tr> <tr> <td>Field school on agri-business approach</td> <td>15,000 per unit</td> <td></td> <td></td> </tr> </table>	Field school on farm/water management	10,000 per unit	Study tour	10,000 ~ 26,000 per unit	Field school on agri-business approach	15,000 per unit						
Field school on farm/water management	10,000 per unit	Study tour	10,000 ~ 26,000 per unit										
Field school on agri-business approach	15,000 per unit												
7-2.	Program Selection & Estimated Annual Program Cost												
	Program selection to be made at the time of preparation of the Annual Work Program on need basis.												
	Annual program costs tentatively estimated: Rp. 40 million												
8. Participation Enhancement Package Program													
8-1.	Program Objectives												
	The program aims at introducing the participatory planning and evaluation of government agricultural support programs or activities to ensure implementation of such activities based on area specific needs.												
8-2.	Program Activities												
	Workshop at (project or program) sub-district & district level for planning & evaluation												
8-3.	Participants												
	Workshop at sub-district: Representatives of target groups (farmers)												
	Workshop at district: Representatives of extension staffs & target groups (farmers)												
8-4.	Program Requirements												
	<ul style="list-style-type: none"> - In time for planning of support services activities - At the end of support services activities 												
8-5.	Estimated Program Costs (Rp. 000)												
	Workshop at sub-district 1,000 per unit Workshop at district 3,000 per unit												

Table B-3.3.5 Proposed Implementation Schedule for Agriculture Extension Services Strengthening (AESS)

Activities/Programs	Item	Implementation Schedule / Year										Overall	Remarks			
		Construction Stage					Operation Stage									
		1st	2nd	3rd	4th	5th	1st	2nd	3rd	4th	5th					
Project Activates																
1. Formulation of Implementation Plan	Schedule	.....													
2. Establishment of Extension System	Schedule		.....												
3. Formulation of Annual Work Program & Budget Arrangement	Schedule		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
4. Preparation of Extension Materials	Schedule		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
5. Monitoring & Evaluation	Schedule		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Project Programs																
1. Institutional Strengthening Package Program	Schedule	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1.1 Establishment of Regional Task Force Team																
- Regional Task Force Team	Schedule	.....													
- Sub-regional Task Force Team	Schedule	.....													
1.2 Staff Empowerment Program																
- Regional Staff Empowerment Sub-program	Schedule															
	Packet	1	3	2	2										8 packets	
	Cost Schedule	5	20	10	15										50 Rp. million	With field activities: Rp. 10 M Without field activities: Rp. 5 M
- Agriculture & Extension Staffs Empowerment Sub-program	Schedule															
	Unit	1	3	2	3	1									10 packets	
	Cost Schedule	5	20	10	20	5									60 Rp. million	With field activities: Rp. 10 M Without field activities: Rp. 5 M
1.3 Strengthening of Extension Facilities (BPP)	Schedule															
	Unit		2												2 unit	
	Cost Schedule		50												50 Rp. million	
2. Farmer Organizations Empowerment Package Program	Schedule		-	-	-	-	-	-	-	-	-	-	-	-	-	
2.1 Kelompok Tani (KT) Empowerment Sub-program	Schedule															
	Packet		1	1	1	1									4 packets	
	Cost Schedule		22.5	22.5	22.5	22.5									90 Rp. million	50 ha/KT = 81 KT/scheme 1 packet/10 KT
2.2 UPJA Formation Sub-program	Schedule															
	Packet			1	1										2 packets	1 sub-district/packet
	Cost Schedule			81	81										162 Rp. million	
2.3 Agri-business Promotion Package Program	Schedule															
	Packet				1	1									2 packets	1 packet/5 KT
	Cost Schedule				58	58									116 Rp. million	10 KT in 2 years
3. Technical Guidance Package Program	Schedule															
	Packet			1	1	1									3 packets	
	Cost Schedule			40	40	40									120 Rp. million	
4. Participation Enhancement Package Program	Schedule															
	Packet		4	4	4	2									14 packets	2 packets each at sub-districts & district
	Cost Schedule		8	8	8	4									28 Rp. million	
	Overall Cost Schedule	10	121	172	245	130									676 Rp. million	
Ordinal Extension Programs	Schedule	

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Programs not accommodated in the project costs

Table B-4.2.1 Direct Construction Cost

(1/2)

Work Description	Unit	Quantity	Unit Price (Rp.)	Amount (Rp.)
I. Diversion Weir				
1.1 Rehabilitation of Weir				
1.1.1 Removal of sedimentation	m3	2,000	30,000	60,000,000
1.1.2 Concrete works for bridge	m3	50	500,000	25,000,000
1.1.3 Pavement works for bridge	m3	50	500,000	25,000,000
1.1.4 Repair of overflow weir	m3	600	800,000	480,000,000
1.1.5 Concrete blocks	m3	1,200	500,000	600,000,000
1.1.6 Gabion mattress	m3	3,400	500,000	1,700,000,000
1.1.7 Gate works	ton	6	40,000,000	240,000,000
1.1.8 Concrete works for intake	m3	50	500,000	25,000,000
1.1.9 Dewatering works	day	60	7,500,000	450,000,000
1.1.10 Contingency (15%)				540,750,000
Sub-total				4,145,750,000
1.2 Settling Basin				
1.2.1 Excavation	m3	18,000	13,000	234,000,000
1.2.2 Backfill	m3	8,500	30,000	255,000,000
1.2.3 Concrete 18N	m3	1,000	350,000	350,000,000
1.2.4 Concrete 13N	m3	60	320,000	19,200,000
1.2.5 Reinforcement bars	ton	100	6,000,000	600,000,000
1.2.6 Form	m2	6,400	100,000	640,000,000
1.2.7 Gate works	ton	5	40,000,000	200,000,000
1.2.8 Stoplog	ton	1	20,000,000	10,000,000
1.2.9 Contingency (15%)				346,230,000
Sub-total				2,654,430,000
Total I				6,800,180,000
II. Main Canal Works				
2.1 Main Canal, Canal Works				
2.1.1 Excavation	m3	103,000	13,000	1,339,000,000
2.1.2 Excavation, existing canal	m3	56,000	25,000	1,400,000,000
2.1.3 Embankment, dike	m3	94,000	30,000	2,820,000,000
2.1.4 Embankment, inside	m3	56,000	50,000	2,800,000,000
2.1.5 Lining concrete	m3	8,500	400,000	3,400,000,000
2.1.6 Sod facing	m2	40,000	6,000	240,000,000
2.1.7 Contingency (15%)				1,799,850,000
Sub-total				13,798,850,000
2.2 Main Canal, Structure Works				
2.2.1 Excavation	m3	4,200	13,000	54,600,000
2.2.2 Embankment/backfill	m3	2,200	30,000	66,000,000
2.2.3 Concrete	m3	1,300	400,000	520,000,000
2.2.4 Form	m2	3,500	100,000	350,000,000
2.2.5 Reinforcement bars	ton	90	6,000,000	540,000,000
2.2.6 Gate	ton	22	30,000,000	660,000,000
2.2.7 Metal works	ton	3	20,000,000	60,000,000
2.2.8 Contingency (15%)				337,590,000
Sub-total				2,588,190,000
2.3 Main Canal, Inspection Road				
2.3.1 Preparatory works	m2	115,000	6,000	690,000,000
2.3.2 Gravel pavement	m3	12,000	100,000	1,200,000,000
2.3.3 Related facilities (10% of above)	lot	1		189,000,000
2.3.4 Contingency (15%)				311,850,000
Sub-total				2,390,850,000
Total II				18,777,890,000

Table B-4.2.1 Direct Construction Cost

(2/2)

Work Description	Unit	Quantity	Unit Price (Rp.)	Amount (Rp.)
III. Secondary Canal (9 nos. of SC)				
3.1 Secondary Canal, Canal Works				
3.1.1 Excavation	m3	0	13,000	0
3.1.2 Excavation, existing canal	m3	64,000	25,000	1,600,000,000
3.1.3 Embankment, dike	m3	80,000	30,000	2,400,000,000
3.1.4 Embankment, inside	m3	64,000	50,000	3,200,000,000
3.1.5 Lining concrete	m3	7,500	400,000	3,000,000,000
3.1.6 Sod facing	m2	77,000	6,000	462,000,000
3.1.7 Contingency (15%)				1,599,300,000
Sub-total				12,261,300,000
3.2 Secondary Canal, Structure Works				
3.2.1 Excavation	m3	900	13,000	11,700,000
3.2.2 Embankment/backfill	m3	600	30,000	18,000,000
3.2.3 Concrete	m3	300	400,000	120,000,000
3.2.4 Form	m2	1,500	100,000	150,000,000
3.2.5 Reinforcement bars	ton	22	6,000,000	132,000,000
3.2.6 Gate	ton	14	30,000,000	420,000,000
3.2.7 Contingency (15%)				127,755,000
Sub-total				979,455,000
3.3 Secondary Canal, Inspection Road				
3.3.1 Preparatory works	m2	120,000	6,000	720,000,000
3.3.2 Gravel pavement	m3	12,000	100,000	1,200,000,000
3.3.3 Related facilities (10 % of above)	lot	1	672,000,000	192,000,000
3.3.4 Contingency (15%)				316,800,000
Sub-total				2,428,800,000
Total III				15,669,555,000
IV. Drainage Works				
4.1 10 % of (II+III)	L.S	1	3,444,744,500	3,444,744,500
Total IV				3,444,744,500
V. On-Farm Development				
5.1 Irrigated Paddy Field	ha	2,791	2,000,000	5,582,000,000
5.2 Paddy field under rain fed condition	ha	1,246	2,500,000	3,115,000,000
Total V				8,697,000,000
VI. Project Facility				
6.1 Gate keepers house	house	4	30,000,000	120,000,000
6.2 Field cars	nos.	3	300,000,000	900,000,000
6.3 Motor cycle	nos.	20	20,000,000	400,000,000
6.4 Office equipment	L.S	1	150,000,000	150,000,000
Total VI				1,570,000,000
Grand Total				54,959,369,500

Table B-6.2.1 Economic Project Costs of Kalaena Kiri Scheme

Unit: Million Rp.		
Item	Cost	Remarks
Initial Investment Costs		
1. Direct Construction Cost (Irrigation System Rehabilitation)	52,812	including physical contingency and project facilities
2. Institutional & Extension Services Strengthening	1,072	
3. Consulting Service	3,728	
4. Administration	1,261	
Total	58,873	
Running Costs		
1. Incremental O&M cost	570	per year
2. Replacement Cost	1,570	per 10 years
Total	2,140	

Table B-6.2.2 Estimation of Economic Prices

(1/2)

Item	Import Parity			Export Parity		
	Operation	US\$/ton	Rp/kg	Operation	US\$/ton	Rp/kg
Rice						
1. Thai 5% broken, 2005 (constant 1990 price) *1*3		226.9			226.9	
2. Adjusted to 2003 constant price	99.33%	225.4		99.33%	225.4	
3. Quality adjustment	90%	202.8		90%	202.8	
4. Freight and insurance (Bangkok-Indonesia)	+	40.0				
5. CIF Indonesia		242.8			202.8	
6. Conversion to Rupiah *2			2,010			1,679
7. Losses and port handling	5% +	101		5% -	84	
8. Transportation (port to wholesaler)	+	40		-	40	
9. Ex-wholesaler			2,151			1,555
10. Handling and transportation (wholesaler to mill)	-	80		-	80	
11. Ex-mill		2,071			1,475	
12. Conversion to paddy	68%	1,408		68%	1,003	
13. By-products (rice bran: 20% of paddy x Rp100/kg)	+	100		+	100	
14. Milling cost	-	100		-	100	
15. Transportation (mill to farm)	-	20		-	20	
16. Economic farm gate price			1,388			983
(Rounded)			1,390			980
17. Weighted average economic farm gate price (import 100%, export 0%)						1,390
Maize						
1. Export price, 2005 (constant 1990 price) *1		111.0			111.0	
2. Adjusted to 2003 constant price	99.33%	110.3		99.33%	110.3	
3. Freight and insurance (gulf ports-Indonesia)	+	40.0				
4. CIF Indonesia		150.3			110.3	
5. Conversion to Rupiah *2			1,244			913
6. Losses and port handling	5% +	62		5% -	46	
7. Transportation (port to wholesaler)	+	40		-	40	
8. Ex-wholesaler			1,346			827
9. Handling and transportation (wholesaler to project area)	-	80		-	80	
10. Ex-wholesaler price			1,266			747
11. Local transportation and handling losses	-	50		-	50	
12. Economic farm gate price			1,216			697
(Rounded)			1,220			700
13. Weighted average economic farm gate price (import 100%, export 0%)						1,220
Soybean						
1. Export price, 2005 (constant 1990 price) *1		226.9			226.9	
2. Adjusted to 2003 constant price	99.33%	225.4		99.33%	225.4	
3. Freight and insurance (gulf ports-Indonesia)	+	35.0				
4. CIF Indonesia		260.4			225.4	
5. Conversion to Rupiah *2			2,156			1,866
6. Losses and port handling	5% +	108		5% -	93	
7. Transportation (port to wholesaler)	+	40		-	40	
8. Ex-wholesaler			2,303			1,733
9. Handling and transportation (wholesaler to project area)	-	80		-	80	
10. Local transportation and handling losses	-	50		-	50	
11. Economic farm gate price			2,173			1,603
(Rounded)			2,170			1,600
12. Weighted average economic farm gate price (import 100%, export 0%)						2,170

*1 Projected price in 2005 at constant 1990 price

Source: World Bank, *Global Economic Prospects 2003*.

*2 Exchange Rate as of May, 2003 (US\$1.00=Rp. 8,279)

*3 Thai, white, milled, 5% broken, FOB Bangkok.

Table B-6.2.2 Estimation of Economic Prices

(2/2)

Item	Import Parity			Export Parity		
	Operation	US\$/ton	Rp/kg	Operation	US\$/ton	Rp/kg
Groundnut						
1. Export price, 2005 (constant 1990 price) *1		791.6			791.6	
2. Conversion to price of shelled groundnut	63%	498.7		63%	498.7	
3. Adjusted to 2003 constant price	99.33%	495.4		99.33%	495.4	
4. Freight and insurance (gulf ports-Indonesia)	+	35.0				
5. CIF Indonesia		530.4			495.4	
6. Conversion to Rupiah *2			4,391			4,101
7. Losses and port handling	5% +	220		5% -		205
8. Transportation (port to wholesaler)	+	40		-		40
9. Ex-wholesaler			4,650			3,856
10. Handling and transportation (wholesaler to project area)	-	80		-		80
11. Local transportation and handling losses	-	50		-		50
12. Economic farm gate price (Rounded)			4,520			3,726
			4,520			3,730
13. Weighted average economic farm gate price (import 50%, export 50%)						4,130
Urea						
1. Export price, Europe, bagged, 2005 (constant 1990 price) *1					122.3	
2. Adjusted to 2003 constant price				99.33%	121.5	
3. FOB Indonesia port					121.5	
4. Conversion to Rupiah *2						1,006
5. Transportation (port to wholesaler)				+		40
6. Port handling, storage, and losses				+		80
7. Handling and transportation cost to project site				+		120
8. Economic price of bagged urea at farm gate (Rounded)						1,246
						1,250
TSP						
1. Export price, Europe, bagged, 2005 (constant 1990 price) *1		144.8			144.8	
2. Adjusted to 2003 constant price	99.33%	143.8			143.8	
3. Freight and insurance	+	55.0				
4. CIF Indonesia port		198.8			143.8	
5. Conversion to Rupiah *2			1,646			1,191
6. Port handling, storage, and losses	+	120		+	120.0	120
7. Bagging cost	+	50		+	50.0	50
8. Handling and transportation cost to project site	+	120		+	120.0	120
9. Economic price of bagged TSP at farm gate (Rounded)			1,936		290.0	1,481
			1,940			1,480
10. Weight average economic farm gate price (import 80%, export 20%)						1,710
Potassium Chloride (KCl)						
1. Export price, Europe, bagged, 2005 (constant 1990 price) *1		119.7				
2. Adjusted to 2003 constant price	99.33%	118.9				
3. Freight and insurance	+	50.0				
4. CIF Indonesia port		168.9				
5. Conversion to Rupiah *2			1,398			
6. Port handling, storage, and losses	+	120				
7. Bagging cost	+	50				
8. Handling and transportation cost to project site	+	120				
9. Economic price of bagged urea at farm gate (Rounded)			1,688			
			1,690			

*1 Projected price in 2005 at constant 1990 price

Source: World Bank, Global Economic Prospects 2003.

*2 Exchange Rate as of May, 2003 (US\$1.00=Rp. 8,279)

*3 Thai, white, milled, 5% broken, FOB Bangkok.

Table B-6.2.3 Economic Prices: Summary Table

Item	Unit	Financial Price (FP) *1	Economic Price *2
(1) Farm Products			
Paddy	(Rp/kg)	1,300	1,390
Maize	(Rp/kg)	1,000	1,220
Cacao Beans	(Rp/kg)	9,500	9,500
(2) Seeds			
Paddy	(Rp/kg)	2,000 & 3,000	2,000 & 3,000
Maize	(Rp/kg)		
Maize (Hybrid)	(Rp/kg)	21,000	21,000
(3) Fertilizers			
Urea	(Rp/kg)	1,300	1,250
TSP	(Rp/kg)	1,800	1,710
KCl	(Rp/kg)	2,100	1,690
ZA *3	(Rp/kg)	1,400	1,250
(4) Agro-chemicals			
Insecticide (liquid type)	(Rp/lit)	50,000	50,000
Insecticide (powder type)	(Rp/kg)	30,000	30,000
Herbicide	(Rp/lit)	30,000	30,000
Rodenticide	(Rp/kg)	35,000	35,000
(5) Hired Labor			
Labor	(Rp/man-day)	Financial prices x 0.8	
Contracted works			
- Planting/transplanting	(Rp)	Financial prices x 0.8	
- Harvesting	(Rp)	Financial prices x 0.8	
(6) Land Preparation Work (machinery)		Financial prices x 1.0	
(7) Shelling Cost		Financial prices x 0.8	
(8) Field Transportation Cost		Financial price x SCF (0.9)	

*1 As of year 2003

*2 Projected Prices in year 2005

*3 ZA is estimated as equivalent to Urea

Table B-6.2.4 Economic Crop Budget per Ha under Present/Without Project: Kalaena Kiri

Items	Unit	Unit Price (Rp. 000)	Rainfed Paddy		Irrigated Paddy			
					Wet Season		Dry Season	
			Q'ty	Value (Rp. 000)	Q'ty	Value (Rp. 000)	Q'ty	Value (Rp. 000)
1. Gross Return								
Unit Yield	(t/ha)		3.0		4.0		4.0	
Unit Price	(Rp. 000/t)			1,390		1,390		1,390
Gross Return	(Rp. 000)			4,170		5,560		5,560
2. Production cost				1,825		2,388		2,388
2-1. Farm Inputs				286		550		550
Seed 1/	(kg)	2.0	30	60	30	60	30	60
Fertilizers				176		398		398
- Urea	(kg)	1.25	100	125	150	188	150	188
- SP36	(kg)	1.71	30	51	75	128	75	128
- KCl	(kg)	1.69	0	0	30	51	30	51
- ZA	(kg)	1.25	0	0	25	31	25	31
Agro chemicals				50		93		93
- Insecticide (liquid)	(lit)	50	1.0	50	1.5	75	1.5	75
- Insecticide (powder)	(kg)	30						
- Rodenticide	(kg)	35			0.5	18	0.5	18
- Herbicide	(kg)	30						
2-2. Labor Costs				1,032		1,280		1,280
Contracted Works								
- Transplanting 2/	(unit)	F x 0.8	1	240	1	240	1	240
- Harvesting 3/	(unit)	F x 0.8		312		416		416
Labor Requirements 4/								
- Hired Labor	(man-day)	12	0	0	5	60	5	60
- Family Labor	(man-day)	12	40	480	47	564	47	564
Total	(man-day)		40		52		52	
2-3. Land Preparation				350		350		350
- Machinery	(unit)		1	350	1	350	1	350
- Draft Animal	(unit)							
2-4. Field Transportation 5/	(L.S.)	F x 0.9	2 %	70	2 %	94	2 %	94
2-5. Miscellaneous Expenses	(L.S.)		5 %	87	5 %	114	5 %	114
3. Net Return	Rp. 000			2,345		3,172		3,172
	%			56		57		57
	Rounded			2,340		3,170		3,170

1/: Seed price: Rainfed --- Rp. 2,000/kg; Irrigated field --- yield level < 5.0 Rp. 2,000; yield level \geq 5.0 Rp. 3,200

2/: Contract work for transplanting assumed --- Rp. 300,000/ha at financial price by 15 laborers; Economic cost = financial cost x 0.8

3/: Share harvesting (borogan) system assumed: Economic cost = financial cost x 0.8

4/: Hired Labor Requirements --- assumed to be 10% of total labor requirements in irrigated field

5/: Economic cost = financial cost x 0.9

Table B-6.2.6 Economic Crop Budget per Ha under With Project: Kalaena Kiri

Items	Unit	Unit Price (Rp. 000)	Irrigated Paddy				Maize (hybrid)	
			Wet Season		Dry Season		Dry Season	
			Q'ty	Value (Rp. 000)	Q'ty	Value (Rp. 000)	Q'ty	Value (Rp. 000)
1. Gross Return								
Unit Yield	(t/ha)		5.0		5.0		5.0	
Unit Price	(Rp.000/t)			1,390		1,390		1,220
Gross Return	(Rp.000)			6,950		6,950		6,100
2. Production cost				2,706		2,706		2,736
2-1. Farm Inputs				<i>714</i>		<i>714</i>		<i>1,035</i>
Seed 1/	(kg)		30	96	30	96	20	420
Fertilizers				525		525		463
- Urea	(kg)	1.25	200	250	200	250	200	250
- SP36	(kg)	1.71	75	128	75	128	75	128
- KCl	(kg)	1.69	50	85	50	85	50	85
- ZA	(kg)	1.25	50	63	50	63		
Agro chemicals				93		93		153
- Insecticide (liquid)	(lit)	50	1.5	75	1.5	75	1.5	75
- Insecticide (powder)	(kg)	30						
- Rodenticide	(kg)	35	0.5	18	0.5	18	0.5	18
- Herbicide	(kg)	30					2.0	60
2-2. Labor Costs				<i>1,396</i>		<i>1,396</i>		<i>1,200</i>
Contracted Works								
- Transplanting 2/	(unit)	F x 0.8	1	240	1	240		
- Harvesting 3/	(unit)	F x 0.8		520		520		360
Labor Requirements 4/								
- Hired Labor	(man-day)	12	5	60	5	60	7	84
- Family Labor	(man-day)	12	48	576	48	576	63	756
Total	(man-day)		53		53		70	
2-3. Land Preparation				<i>350</i>		<i>350</i>		<i>0</i>
- Machinery	(unit)		1	350	1	350		
- Draft Animal	(unit)							
2-4. Field Transportation 5/	(L.S.)	F x 0.9		<i>117</i>		<i>117</i>		<i>90</i>
2-5. Shelling 6/	(L.S.)	F x 0.8						<i>280</i>
2-5. Miscellaneous Expenses	(L.S.)		5 %	<i>129</i>	5 %	<i>129</i>		<i>130</i>
				5		5		6
3. Net Return	Rp.000			4,244		4,244		3,364
	%			61		61		55
	Rounded			<i>4,240</i>		<i>4,240</i>		<i>3,360</i>

1/: Paddy seed price: Irrigated field --- yield level < 5.0 Rp. 2,000/kg; yield level \geq 5.0 Rp. 3,200/kg; maize Rp.21,000/kg

2/: Contract work for transplanting assumed --- Economic cost = financial cost x 0.8

3/: Share harvesting (borogan) system assumed; Economic cost = financial cost x 0.9; maize: financial cost x 0.8

4/: Hired Labor Requirements --- assumed to be 10% of total labor requirements in irrigated field

5/: Economic cost = financial cost x 0.9

6/: Economic cost = financial cost x 0.8

Table B-6.2.7 Financial and Economic Net Production Values under With and Without Project

1. Financial Net Production Value

Crops/Cropping Season	Without Project			With Project			
	Area (ha)	Net Return (Rp. 000/ha)	Net Prod. Value (Rp. million)	Area (ha)	Net Return (Rp. 000)	Net Prod. Value (Rp. million)	Increment (Rp. million)
Irrigated Paddy							
Wet Season	2,375	3,170	7,529	4,037	4,120	16,632	9,104
Dry Season II	2,375	3,170	7,529	4,037	4,120	16,632	9,104
Annual	4,750		15,058	8,074		33,265	18,207
Rainfed Paddy 1/ Wet Season	832	2,420	2,013				-2,013
Palawija (maize) Dry Season I				404	2,820	1,139	1,139
Cacao	830	4,304	3,572				
Total	6,412		20,643	8,478		34,404	13,761

2. Economic Net Production Value

Crops/Cropping Season	Without Project			With Project			
	Area (ha)	Net Return (Rp. 000/ha)	Net Prod. Value (Rp. million)	Area (ha)	Net Return (Rp. 000)	Net Prod. Value (Rp. million)	Increment (Rp. million)
Irrigated Paddy							
Wet Season	2,375	3,170	7,529	4,037	4,240	17,117	9,588
Dry Season II	2,375	3,170	7,529	4,037	4,240	17,117	9,588
Annual	4,750		15,058	8,074		34,234	19,176
Rainfed Paddy 1/ Wet Season	832	2,340	1,947				
Palawija (maize) Dry Season I				404	3,360	1,357	1,357
Cacao 1/	830						
Total	6,412		17,004	8,478		35,591	18,587

1/: Annual net production value shown in the following table

3. Net Production Value of Cacao 2/

Year after Planting	Financial Net Production Value			Economic Net Production Value			Remarks
	Area (ha)	Net Return (Rp. 000/ha)	Net Prod. Value (Rp. million)	Area (ha)	Net Return (Rp. 000/ha)	Net Prod. Value (Rp. million)	
5th year	830	4,462	3,703	830	4,865	4,038	Assuming re-conversion to paddy field start in the 5th year after planting
6th year	830	5,800	4,814	830	6,240	5,179	
7th year	830	7,122	5,911	830	7,602	6,310	
8th ~ 11th year	830	7,783	6,460	830	8,282	6,874	
12th year	830	7,122	5,911	830	7,602	6,310	
13th year	830	6,461	5,363	830	6,921	5,744	
14th ~ 15th year	830	5,800	4,814	830	6,240	5,179	
16th ~ 18th year	830	5,139	4,265	830	5,559	4,614	
19th ~ 20th year	830	4,462	3,703	830	4,865	4,038	
21st year	830	3,801	3,155	830	4,184	3,473	
22nd year	830	3,140	2,606	830	3,504	2,908	
23rd year and on	830	1,140	946	830	1,448	1,202	

1/: Paddy grown under rainfed condition in irrigation command area

2/: Details shown in Table 3.3.2 & 6.2.5 financial & economic crop budget of cacao

Table B-6.2.8 Annual Economic Costs and Benefit flow and the Results of Economic Evaluation (Kalaena Kiri Scheme)

(Rp. Million)

Year	Economic Costs				Economic Benefits			Balance
	Initial Investment	O&M	Replacement	Total	Benefit	Negative Benefit	Total	
1	1,544	570		2,114		4,038	-4,038	-6,152
2	1,544	570		2,114		5,179	-5,179	-7,293
3	27,893	570		28,463		6,310	-6,310	-34,773
4	27,893	570		28,463	5,576	6,874	-1,298	-29,761
5		570		570	11,152	6,874	4,278	3,708
6		570		570	13,011	6,874	6,137	5,567
7		570		570	14,869	6,874	7,995	7,426
8		570		570	16,728	6,310	10,418	9,848
9		570		570	18,587	5,744	12,843	12,273
10		570		570	18,587	5,179	13,408	12,838
11		570	1,570	2,140	18,587	5,179	13,408	11,268
12		570		570	18,587	4,614	13,973	13,403
13		570		570	18,587	4,614	13,973	13,403
14		570		570	18,587	4,614	13,973	13,403
15		570		570	18,587	4,038	14,549	13,979
16		570		570	18,587	4,038	14,549	13,979
17		570		570	18,587	3,473	15,114	14,544
18		570		570	18,587	2,908	15,679	15,109
19		570		570	18,587	1,202	17,385	16,815
20		570		570	18,587	1,202	17,385	16,815
21		570	1,570	2,140	18,587	1,202	17,385	15,245
22		570		570	18,587	1,202	17,385	16,815
23		570		570	18,587	1,202	17,385	16,815
24		570		570	18,587	1,202	17,385	16,815
25		570		570	18,587	1,202	17,385	16,815
26		570		570	18,587	1,202	17,385	16,815
27		570		570	18,587	1,202	17,385	16,815
28		570		570	18,587	1,202	17,385	16,815
29		570		570	18,587	1,202	17,385	16,815
30		570		570	18,587	1,202	17,385	16,815

B-C =	13,943	B/C =	1.29	EIRR =	12.1%
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Table B-6.3.1 Farm Budget Analysis on 1Ha of Paddy Field

1. Current Irrigated Paddy Field: Double Cropping of Paddy

Items/Crop	Without/Present Condition			Without/Present Condition			Incremental Net Return per Farm (Rp. 000)
	Cropped Area (ha)	Net Return		Cropped Area (ha)	Net Return		
		per Ha (Rp. 000)	per Farm (Rp. 000)		per Ha (Rp. 000)	per Farm (Rp. 000)	
1. Net Farm Income from 1 Ha of Paddy Field							
- Irrigated Paddy			6,340			8,240	1,900
Wet Season	1.00	3,170	3,170	1.00	4,120	4,120	950
Dry Season I							
Dry Season II	1.00	3,170	3,170	1.00	4,120	4,120	950
- Rainfed Paddy 1/							
- Palawija (maize hybrid): Dry Season I				0.10	2,820	282	282
Total			6,340			8,522	2,182
		Rounded	6,340		Rounded	8,520	2,180
2. Incremental Family Expenditures 2/			-			852	852
3. Net Reserve			6,340			7,668	1,328
					Rounded	7,670	1,330

2. Rainfed Paddy Field

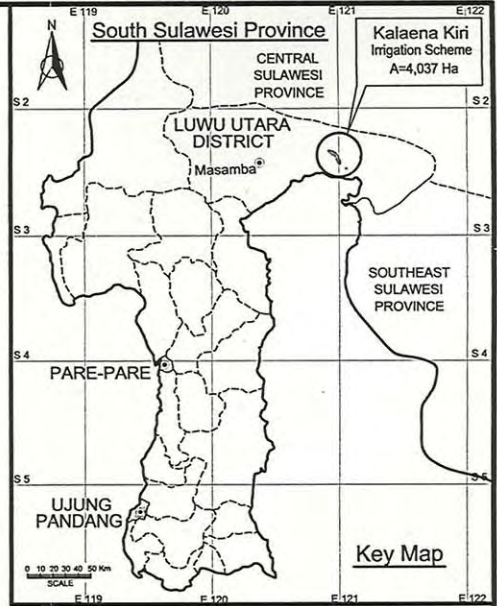
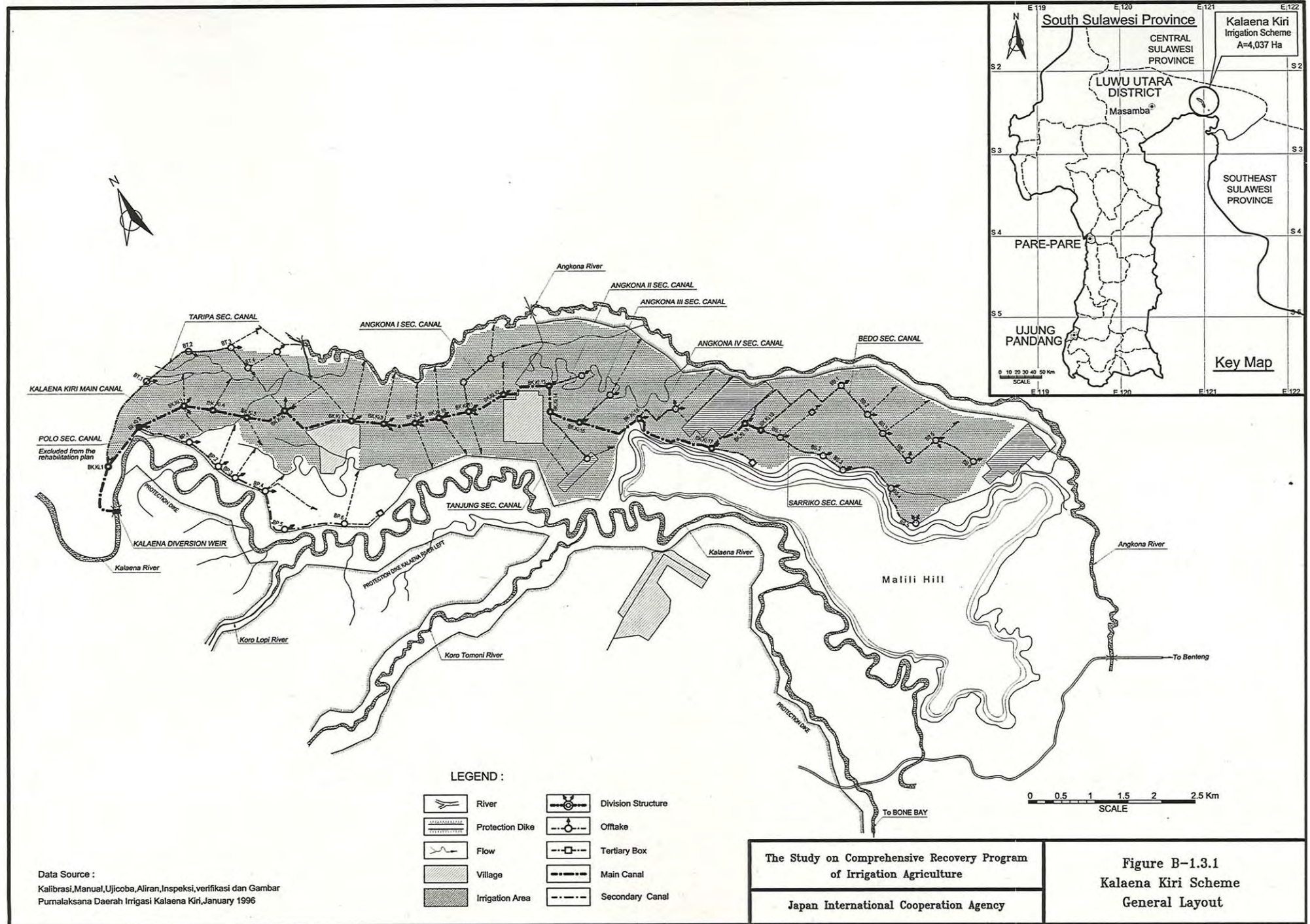
Items/Crop	Without/Present Condition			Without/Present Condition			Increment per Farm (Rp. 000)
	Cropped Area (ha)	Net Return		Cropped Area (ha)	Net Return		
		per Ha (Rp. 000)	per Farm (Rp. 000)		per Ha (Rp. 000)	per Farm (Rp. 000)	
1. Net Farm Income from 1 Ha of Paddy Field							
- Irrigated Paddy						8,240	8,240
Wet Season				1.00	4,120	4,120	4,120
Dry Season I							
Dry Season II				1.00	4,120	4,120	4,120
- Rainfed Paddy 1/	1.00	2,420	2,420				-2,420
- Palawija (maize hybrid): Dry Season I				0.10	2,820	282	282
Total			2,420			8,522	6,102
		Rounded	2,420		Rounded	8,520	6,100
2. Incremental Family Expenditures 3/			-			1,704	1,704
3. Net Reserve			2,420			6,816	4,396
					Rounded	6,820	4,400

1/: Paddy grown under rainfed condition in irrigation command area

2/: Incremental family expenditure under with project condition assumed to be 10% of net return per ha; which to be covered by an income increase from paddy field

3/: Incremental family expenditure under with project condition assumed to be 20% of net return per ha; which to be covered by an income increase from paddy field

Figures



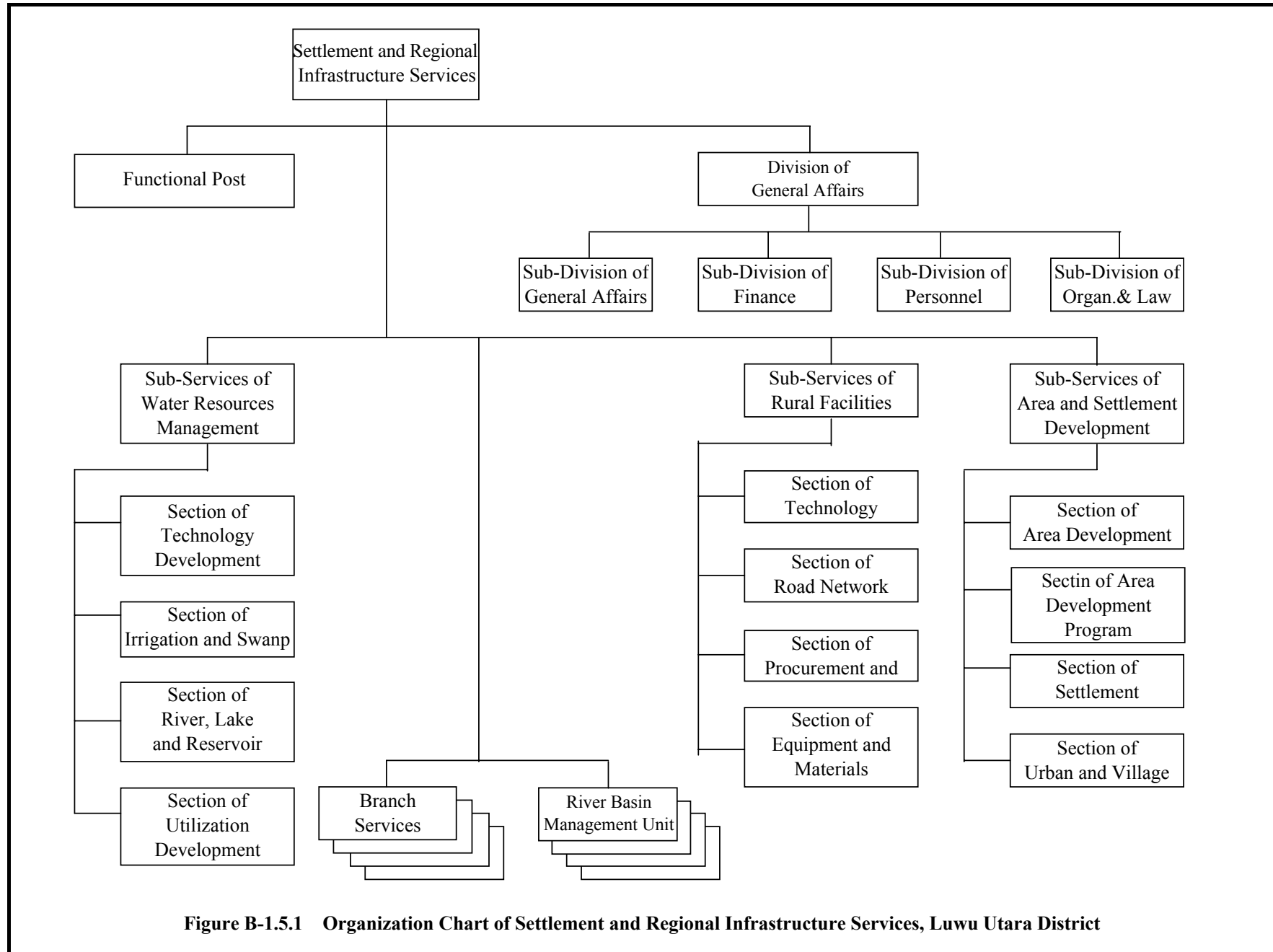


Figure B-1.5.1 Organization Chart of Settlement and Regional Infrastructure Services, Luwu Utara District

Figure B-3.3.1 Planned Cropping Pattern: Kalaena Kiri Irrigation Scheme

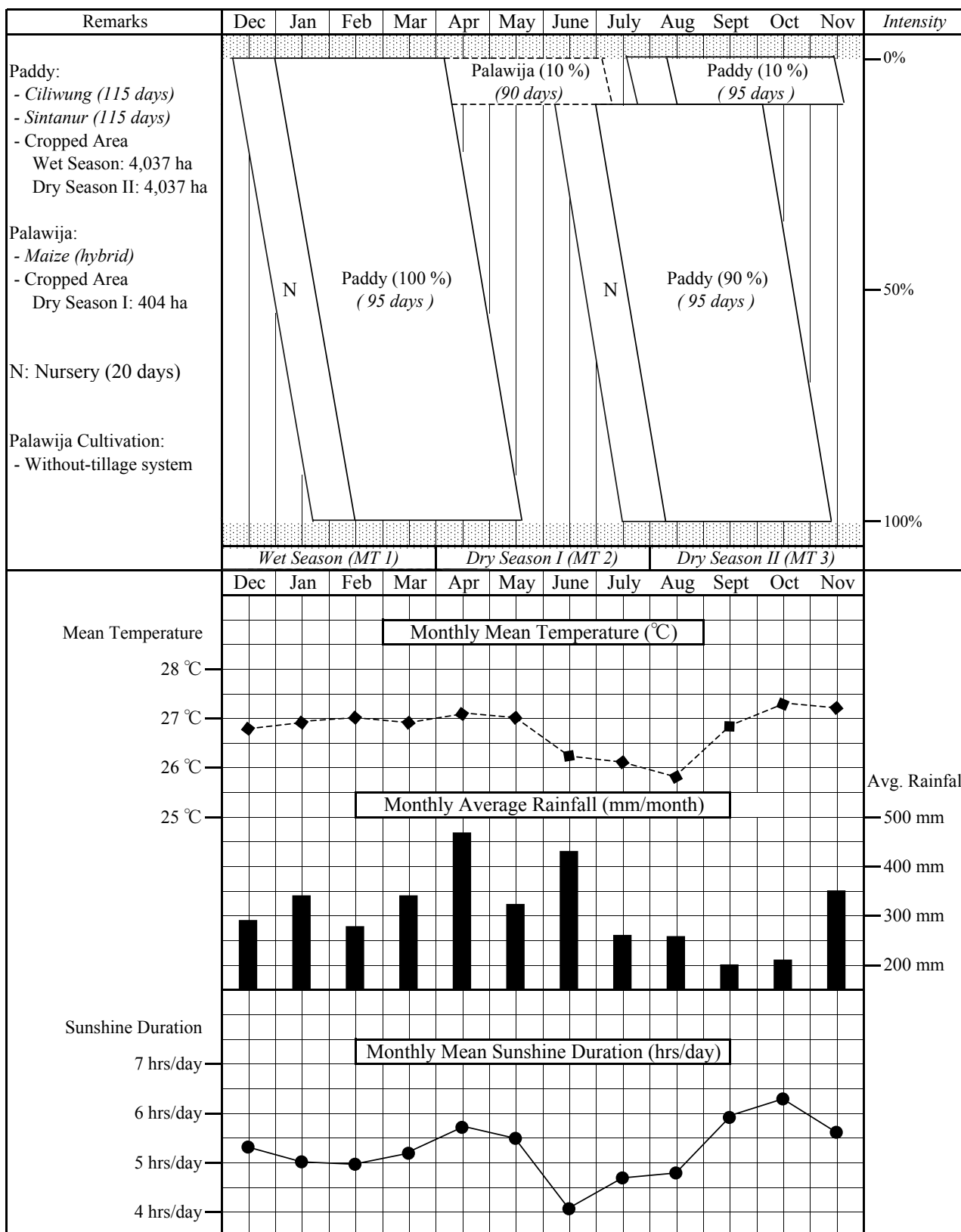


Figure B-5.3.1 Implementation Program of Rehabilitation Work for Kalaena Kiri Irrigation Scheme

Phase	Sector	Item of Implementation		Year from Commencement of Midterm Phase									
		Item	Works	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
Midterm	1. Irrigation/ Civil Works	Feasibility Study	Procurement of consultant	[Bar from 1st to 2nd]									
			Preparation of F/S	[Bar from 1st to 2nd]									
			Preparation of Implementation Schedule	[Bar from 1st to 2nd]									
	2. Institution	Strengthening Program	Government staff	[Bar from 1st to 2nd]									
			Water Users Association	[Bar from 1st to 2nd]									
			Initial setting-up of FWUA and MWUA	[Bar from 1st to 2nd]									
	3. Project Budget		Budget arrangement	[Bar from 1st to 2nd]									
Final	1. Irrigation/ Civil Works	Implementation	Procurement of consultant	[Bar from 2nd to 3rd]									
			Detailed design	[Bar from 2nd to 3rd]									
			Tender for procurement of contractor	[Bar from 3rd to 4th]									
			Civil works for rehabilitation	[Bar from 4th to 6th]									
	2. Institution	Training and Guidance	O&M for tertiary and on-farm	[Bar from 5th to 6th]									
			Collection of irrigation service fee and accounting	[Bar from 5th to 6th]									
	3. Extension Service												
			Formulation of task force team	[Bar from 2nd to 3rd]									
			Formulation of strengthening program	[Bar from 2nd to 3rd]									
			Identification and confirmation of constraints	[Bar from 2nd to 3rd]									
			Countermeasures or technology to be introduced for mitigation of constraints	[Bar from 2nd to 3rd]									
			Preparation of detailed program for strengthening	[Bar from 2nd to 3rd]									
			Implementation of program										
			Preparation of annual program	[Bar from 4th to 5th]									
			Budget arrangement	[Bar from 4th to 5th]									
			Preparation of detailed agreed plan of operation	[Bar from 5th to 6th]									
			Preparation extension materials	[Bar from 5th to 6th]									
			Implementation of program, monitoring and evaluation	[Dashed bar from 5th to 10th]									