

Within the rubber areas, young tree areas which have no production are considerably large at about 34% of the total areas due mainly to recent large development of NESs. Old tree areas are also large particularly in individual smallholders and private estates and accounted for about 13% and 15% of total rubber areas, respectively. Such relatively large extent of the young and old tree areas is considered to be one of the reasons of low productivity of estate crops in the Study Area.

3.3.4 Livestock

In terms of livestock population per 100 farm households, there are no big differences on chickens among the five Kabupatens in the Study Area, ranging from 1,890 heads/100 farm households in Hulu Sungai Tengah to 1,240 heads/100 farm households in Hulu Sungai Utara as shown in Table 3.17. However, there are big differences on ducks, ranging from 1,910 heads/100 farm households in Hulu Sungai Utara to 340 heads/100 farm households in Tapin. The population of improved chickens is about 77 heads/100 farm households in the Study Area, and this number is about the half of that in South Kalimantan (166 heads/100 farm households) and Indonesia (164 heads/100 farm households).

Cattle is utilized mainly as a motive power for land preparation and transportation in the Study Area. Its population is relatively large in Tapin in terms of livestock population per 100 farm households. It is about 40 heads/100 farm households or nearly 90% of the average of Indonesia as a whole (45 heads/100 farm households), while that in the Study Area is only 21 heads/100 farm households. The population of buffaloes per farm household is the highest in Hulu Sungai Utara (22 heads/100 farm households), about two times higher than that in the Study Area (11 heads/100 farm households) and 1.5 times higher than that in South Kalimantan and Indonesia (both about 15 heads/100 farm households).

Of the total meat production in the Study Area, chicken meat alone accounts for about 60% followed by cattle meat (17%) and duck meat (15%). About 75% of the total meat production are from poultry in the Study Area. As for eggs, about 72% of the total production are from ducks and the remaining 28% are from chickens as shown in Table 3.18. More than the half of the total chicken meat are produced in two Kabupatens of Hulu Sungai Tengah and Hulu Sungai Utara, and more than 60% of the cattle meat are produced in two Kabupatens of Tapin and Tabalong. Milk production is negligible small in the Study Area.

As shown in Table 3.19, higher population growth was performed by goats (8.0% p.a.), chicken (6.2% p.a.), cattle (5.1% p.a.) and duck (4.6% p.a.), but sharp decrease was shown by sheep (-52.3% p.a.) and pig (-8.5% p.a.) during the 1982-1986 period. It is noteworthy that most of all livestock in Tabalong showed minus growth except for chickens.

3.4 Food Balance

Based on the Indonesia's per capita food consumption data prepared by CBS, present food balance in the Study Area is preliminary estimated as shown in Table 3.20. Because no such data is available for the Study Area, per capita consumption at the national level estimated by CBS is directly adopted to the present Study. The regional characteristics on food consumption are, therefore, not taken into account.

Among the food crops, only rice has a sufficient surplus of about 150,700 tons. Productions of other palawija crops, vegetables and fruits are insufficient in the Study Area, except for groundnuts. The surplus of groundnuts is small at about 370 tons or 13% of its total consumption. Freshwater fish has a large surplus of about 28,400 tons. This surplus is the second biggest after rice in weight.

Among the livestock products, eggs have a large surplus of about 6,430 tons. This is about four times of its total consumption. Meat has a surplus of about 850 tons, about 24% of its total consumption.

3.5 Marketing and Processing

3.5.1 Marketing

According to the food balance study made in the above section, it is clarified that the agricultural products which have sufficient marketable surpluses are rice and fishes in the Study Area. In addition to these, rubber also has a sufficient surplus both to the international and internal markets. Other minor food and estate crops and livestock products are generally consumed within the Study Area and/or South Kalimantan.

The Government interventions in the market of agricultural products have concentrated in rice with the object of fostering production and expanding farm incomes. Such interventions are largely implemented by the National Logistics Agency (BULOG) at the national level and the Regional Logistics Depot (DOLOG) at the province level. BULOG has been able to defend the floor price by procuring up to about 10% of total production through the village cooperatives (KUDs). The rice procured or imported by BULOG is released to budget groups such as civil servants and hospitals, and sold through market operation to defend the ceiling price, or placed in stocks to defend the floor price. Through such operations, BULOG has successfully controlled the domestic rice prices both for farmers and consumers, though increasingly large deficits on its operations have been derived in recent years (about Rp. 123 billion in 1986/87).

The BULOG's rice program during the 1978/79-1987/88 period is summarized as shown in Table 3.21. It is noteworthy that BULOG's rice procurement among the total rice production has become decreasingly small percentages in recent years (from 9.2% in 1984/85 to 4.6% in 1987/88), and the end stock was suddenly decreased to about 793,000

tons in 1987/88. This stock level was about 20% lower than the required amount of one million tons for the Indonesia's food security.

In South Kalimantan, DOLOG rice procurement was about 13,200 tons on an average in recent 5 years from 1983/84 to 1987/88 as shown in Table 3.22. This procurement corresponded to only about 2% of the total production and 4% of the estimated rice marketable surplus from the farmers in South Kalimantan as shown below:

a.	Rice production *	586,200 tons	100%	-
b.	Farmers' consumption **	227,100 tons	39%	-
c.	Marketable surplus (a-b)	359,100 tons	61%	100%
d.	Total consumption ***	346,200 tons	59%	-
e.	DOLOG procurement	13,200 tons	2%	4%
f.	Surplus in the Province (a-d)	240,000 tons	41%	-

*: Average annual paddy production in South Kalimantan 1982-86 (862,000 tons) x milling rate (0.68)

** : Farm households in the Province in 1985 (334,400) x Average family size in the Province in 1985 (4.54) x per capita consumption (145.21 kg/year) x rate for other use (1.03)

***: Population in the Province in 1985 (2,315,000) x per capita consumption x rate for other use

DOLOG operates Sub-DOLOGs in two locations, i.e. Barabai and Kotabaru in South Kalimantan for purchasing of paddy/rice in the production area. DOLOG's storage capacity in the Province is about 36,500 tons of which about 9,500 tons or 26% are available in the Study Area as shown in Table 3.23.

According to the information obtained from DOLOG, its rice procurement in the Study Area is about 60% of the total procurement in South Kalimantan in recent years, though the Study Area produces about 50% of the total production in the Province. The marketing flow of rice in the Province is illustrated as shown in Figure 3.1.

KUDs' activities in rice marketing services are still weak in the Province, and in 1987, their procurement for DOLOG was only about 290 tons or about 2% of the total procurement of DOLOG.

Marketable surpluses of other crops from the Study Area are all handled by private sectors in general. Among these, marketing system of rubber, which is the next important crop after rice, is illustrated as shown in Figure 3.2. Most of rubber production in the Study Area is from smallholders. They sell inadequately processed ribbed smoked sheets (RSS) or coagulated rubber to the market and, therefore, this is considered to be the main reason of low quality rubber in South Kalimantan. According to the information obtained from the DINAS Estate Crops, an annual rubber export from South Kalimantan is about 33,000 tons

which is more than the provincial production of about 29,600 tons (1987). The balance of about 3,400 tons is the production from other provinces to South Kalimantan for the processing and export.

3.5.2 Processing

The existing processing facilities for paddy, rubber, coconut, coffee and cocoa in the Study Area are listed as shown in Tables 3.24 and 3.25.

In South Kalimantan, there are 1,247 rice mill units (RMUs) of which 526 units or 42% are located in the Study Area. The total milling capacity in terms of rice is estimated at about 859,000 tons/year in South Kalimantan and 340,000 tons/year in the Study Area. Therefore, it is evaluated that these milling capacities both in South Kalimantan and in the Study Area are enough to cover the rice production in the respective areas, and still have remaining capacities. The remaining capacities estimated are about 272,800 tons (equivalent to 401,200 tons of paddy) in South Kalimantan and 56,100 tons (82,500 tons of paddy) in the Study Area.

As for rubber, a total processing capacity is estimated at about 37,000 tons/year in the Study Area. Out of this capacity, about 26,000 tons/year or 71% are of traditional small scale facilities with an average processing capacity of 15 tons/year/facility. Most of large scale new facilities for rubber processing are located in Banjarmasin and the total processing capacity in whole South Kalimantan is estimated at about 70,300 tons/year. This capacity is quite enough to cover the total rubber production of 28,000 tons/year in South Kalimantan. Accordingly, the remaining capacity is estimated at about 42,000 tons/year in South Kalimantan.

3.6 Agricultural Production Values

Estimate on agricultural gross production values in the Study Area is made by applying current 1988 farm gate prices and average annual productions in recent 5 years from 1982 to 1986 as shown in Table 3.26. As seen in the table, the agricultural gross production values total Rp. 243,056 million. Food crop subsector alone accounts for about 50% of the total gross production values followed by fishery (22%) and estate crops (19%). The share of livestock subsector in gross production value is small at about 9%.

Crop production cost under present conditions are estimated on the basis of farm input level estimated in Annex D Agronomy and data obtained from the Government offices concerned in South Kalimantan. Crop budgets per hectare are then prepared for each crop as shown in Table 3.27. Based on the crop budgets in these tables, the total production cost under present conditions are estimated at about Rp. 81,790 million in the Study Area.

The annual value of net production under present condition in the Study Area is then calculated by deducting the total production cost from the total gross production values. The

annual value of net production in the Study Area is estimated at about Rp. 161,266 million as also shown in Table 3.26,

As seen in the table, food crop subsector has the highest share of about 57% of the total net production values, followed by fishery (23%). Within the food crops, paddy has the biggest share of about 52% in the total net production values. Other food and fruit tree crops in the total net production values are all less than 1%, except for groundnuts (1.3%). Within estate crops, rubber alone accounts for about 10% of the total net production values. Share of all other individual estate crops in the total net production values are less than 1%. Livestock products account for about 9% of the total net production values.

4. AGRICULTURAL SUPPORTING SERVICES

4.1 Institutions in the Sector

The Government's major objectives for the agricultural sector are to 1) create productive employment to raise incomes of the rural poor, 2) increase domestic food supply to keep pace with rising demand, 3) expand agricultural exports particularly of estate crops, and 4) ensure productive and sustainable use of Indonesian's varied land, water and other natural resources.

In order to achieve such objectives, the Government has placed particular emphasis on the consolidation of institutional agricultural services. As a result, various services are now available from various institutions established at respective administration levels of national, province, district, sub-district and village. In South Kalimantan, however, the consolidation of agricultural institutional services has been lately enforced, and this is considered to be one of the main reasons of comparatively lower crop productivities in the Province. The institutions directly and indirectly related to the provincial agricultural services are listed as shown in Table 4.1.

The regional office of agriculture or KANWIL (Kantor Wilaya), which is under the Secretary General of the Ministry of Agriculture, plays a leading role in the agricultural services in South Kalimantan. Regional Departments of Food Crops, Estate Crops, Livestock and Fishery known as DINAS are the provincial representative organizations of the respective Directorates General of the Ministry of Agriculture. These DINAS are administratively responsible to the Governor and Provincial Government, but in general they are held responsible to the respective Central Directorates General for implementation of national programs and technical matters. Each DINAS maintains offices at Kabupaten level known as Cabang DINAS.

The Ministry of Forestry has both KANWIL and DINAS in the South Kalimantan Province and responsibility for identifying, demarcating and protecting forest areas. The Ministry of Cooperatives maintains KANWIL at province level and regency offices at Kabupaten level known as Kandep. Although the KANWIL of Cooperatives has promoted various types of

cooperatives since 1945, much of its emphasis have been put on Village Cooperatives (KUDs). The Ministry of Transmigration provides also KANWIL at province level in South Kalimantan and field offices at the transmigration sites in order to give training services to the migrants. For the development of water resources including irrigation, the Ministry of Public Works maintains the Provincial Office. The services for irrigation, drainage and polder development and operation and maintenance for these works are carried out under the responsibility of the Provincial Public Works.

Beside the above, as seen in Table 4.1, several institutions which are funded by the central government also play an important role in provincial agricultural services. The KANWIL Agriculture is responsible for supervising the activities of such central government institutions in the Province and for coordinating the activities of the provincial agricultural services.

4.2 Agricultural Intensification Program

The agricultural intensification program has been promoted in Indonesia in order to facilitate production increase of food crops with coordination of all the efforts of agricultural supporting services so as to provide a "package" of agricultural inputs to the farmers since 1968. In the program, very high priority has been given to rice production increase, and successful operation of this program is one of the main reasons of Indonesia's achievement of rice self-sufficiency in 1985.

In South Kalimantan, however, consolidation of this program has been lately enforced. In 1980, the intensification program covered only about 27% of wet paddy field in the Province, but this rate became about 75% in 1986, although this rate was comparatively lower than that in other provinces as shown in Table 4.2.

4.3 Research

The Agency for Agricultural Research and Development (AARD) has a net work of 2 research centers for soils and agro-economics, a center for statistics and data processing, a national library, 5 research coordinating centers, 23 research institutes, 42 research stations, and 151 experimental farms/or fish ponds over the whole Indonesia.

In South Kalimantan, there are a research institute for food crops and a veterinary research station both located in Banjarbaru.

The Banjarbaru Research Institute for Food Crops (BARIF) is responsible for research on tidal swamp and freshwater swamp resource use and management. Under the organization of BARIF, there are 10 experimental farms, of which seven are located in South Kalimantan as shown below:

	Name of Experimental Farm	Location		Experimental Farm (ha)
		Kabupaten	Kecamatan	
1.	Handilmanarap	Banjar	Kortak Hanyar	21
2.	Belandean	Batola	Berangas	25
3.	Banjarbaru	Banjarbaru	Banjarbaru	50
*4.	Binuang	Tapin	Binuang	22
*5.	Tanggul	H.S.S.	Simpur	49
*6.	Barabai	H.S.T.	B.A.Utara	10
*7.	Alabio	H.S.U.	Alabio	5
8.	Lempake	East Kalimantan		
9.	Unit Tatas	Central Kalimantan		
10.	Kayu Agung	South Sumatra		

*: Experimental farm in the Study Area

The main activities presently taken by BARIF are research on 1) soil and its fertility, 2) food crops production, 3) rice varietal improvement, 4) crop diseases and pests, and 5) cropping systems in the tidal swamp.

The Veterinary Research Sub-station (VRSS) is the newly established research institute in 1988 in Banjarbaru. This is only 1 sub-station over the country under the organization of Research Institute for Animal Sciences in Bogor, West Java. VRSS is responsible for research on disease and parasite of livestock, mainly those for cattle, water buffaloes, sheep, goats, chickens and ducks. Although VRSS has a plan to establish an experimental farm in Banjarbaru, such facility is still not available at present.

4.4 Extension

The Agency for Agricultural Education, Training and Extension (AAETE) is responsible for all agricultural education, training and extension methodology, and since 1984 it has had overall responsibility for coordinating agricultural extension at the national level.

At the province level, the Governor is administratively responsible for the execution of agricultural extension services. However, in the programming and daily operations of the services, the KANWIL Agriculture, provincial agricultural services (DINAS) and BIMAS Secretariat play a leading role. For the coordination of agricultural extension, there is the Provincial Coordination Forum (PCF) which comprises the KANWIL Agriculture as Chairman, the Secretary of Provincial BIMAS as Secretary, and the heads of provincial agricultural services and chiefs of technical units and other institutions closely linked to agricultural extension as members.

At the Kabupaten level, the Kabupaten administrative head known as Bupati has an administrative responsibility for the agricultural extension services. The District

Coordination Forum (DCF) comprises the head of the subsectors designated by Bupati as Chairman, the Secretary of Kabupaten BIMAS as Secretary, and the heads of the other subsectors and institutions closely related to agricultural extension as members, and DCF itself is responsible for the extension programings at the Kabupaten level and DCF members including chairman and secretary are responsible for technical matters in the respective fields. Outline of the provincial and district agricultural extension services are illustrated as shown in Figure 4.1.

The Rural Extension Center (REC), which has a function as a base camp for the extension services, receives technical support from the member of DCF, though it is administratively located under the line of Governor. REC is responsible for agricultural extension services at field level and each REC covers one to three Kecamatans. There are 25 RECs in the Study Area. Their locations in the Study Area are as shown in Table 4.3.

The daily agricultural extension services are carried out according to the Training and Visit system by the extension agents staying at REC, i.e. field extension supervisors (PPMs) and field extension workers (PPLs). Extension agents (PPMs/PPSs) are supported by subject matter specialists (PPSs). PPS gives technical training to extension agents once in two weeks at REC and extension agents visit farmers' group once in two weeks.

In the Study Area, 12 PPSs and 52 PPMs are arranged at Kabupaten level and 125 PPMs and 317 PPLs are at REC level as shown in Table 4.4. The arrangement of PPSs, PPMs and PPLs by the extension field are summarized as shown in Table 4.5. Among the four extension fields, i.e. food crops, estate crops, livestock and fishery, about 60% to 65% of PPSs/PPMs/PPLs are in the field of food crops, and about 20% to 25% are in the estate crops. While, in the other two fields of livestock and fishery, these percentages are relatively small at about 5% to 15%.

In order to know the status of the arrangement of extension agents in the Study Area, an average number of farm households per extension agent in the Study Area is compared with those in South Kalimantan and the whole Indonesia using 1986/87 data on the number of extension agents and 1983 data on the number of farm households as shown in Table 4.6. As seen in the table, one extension agent assists about 315 farm households in the Study Area and 300 farm households in South Kalimantan, while 608 farm households in the whole Indonesia on an average. Through the comparison, it is clear that the extension agents in the Study Area as well as in South Kalimantan is well arranged in number.

4.5 Institutional Agricultural Credit

The structure of the institutional credit system in South Kalimantan is illustrated in Figure 4.2.

Bank Indonesia (BI) performs the central banking functions and supervises the Government commercial banks (76 banking facilities in the Province), private banks (four facilities) and development banks (six facilities). BI provides liquidity credits to the banks for general

working capital operations as well as for special investment programs and loans made to development projects undertaken by the government agencies of state-owned corporations.

Bank Rakyat Indonesia (BRI), state-owned commercial bank, is tasked with servicing the credit needs of cooperatives, agriculture and the general rural sector. BRI regional branch has credit departments for farmers, fishermen, cooperative credits, investment credit and general credits. In the Investment Credit Department, BRI has special sections for KIK/KMKP financing, research and project development assistance. In South Kalimantan, BRI has a total of 11 branches supplemented by 59 Unit Desas (Village Units). BRI has credit ties with Village Cooperatives (KUDs). BRI has previously used KUD network extensively for most of the BIMAS/INMAS production credit schemes. Starting April 1985, all production credit loans of BRI were transferred to the KUDs under the newly-launched KUT (Integrated Farmer Credit) program.

Bank Pembangunan Daerah (BPD) is the region's development bank. BPD is required to give priority to financing development activities in the region, to lend to economically weak groups, and to finance infrastructural projects. BPD is a handling bank of the Kecamatan Credit (BKK) being funded by USAID. BPD, South Kalimantan has its branch in Barabai, Amuntai, Tanjung and Kota Baru. In addition, BPD has a total of 28 BKK Units being covered by the USAID assisted Regional Development Program (PPW - Program Pengembangan Wilayah) in Tapin, Hulu Sungai Selatan, Hulu Sungai Tengah, Hulu Sungai Utara and Banjar.

In the Study Area, there are five BRI branches and 30 Village Unit BRIs, and three BPD branches and 20 BKK Units as shown in Tables 4.7 and 4.8.

There exist several kinds of credit programs in Indonesia as well as in South Kalimantan. Table 4.9 enlists the high priority programs with rediscount rates and percentage refinancing facilities provided by BI.

Among the credit programs listed in the table, the major programs in the Province are Integrated Farmer Credit (KUT), General Rural Credit (KUPEDES), Small Investment Credit (KIK), Permanent Working Capital Credit (KMKP) and Regional Development credit (BKK).

The loan conditions of these programs are as follows:

	Repayment Period	Grace Period	Interest Per Annum	Max. Loan (Rp)
Working capital credit				
KUT	1 year	1 year	12%	*
KUPEDES	2 years	-	18%	5 million
BKK	3-6 months	-	3.5%	200,000
Investment credit				
KUPEDES	3 years	1 year	12%	5 million
KIK	8 years	4 years	12%	15 million
KMKP	5 years	1 year	12%	15 million

*: Depends on KUD

The annual disbursement to agricultural sector including the above credit programs was about Rp 43 billion on an average in recent 5 years (1983 to 1987) in the Province. This amount was of about 13% of or third biggest in the total credit services of about Rp 326 billion in the Province as shown in Table 4.10. The biggest disbursement was made to the industry sector (38%) followed by the trade sector (27%). These three economic sectors had a share of about 80% in the total disbursement in the Province.

In order to know the status of credit use in the Study Area, loan amount of KUT per farm household is compared with that in South Kalimantan and Indonesia as a whole. The KUT program is considered to be most important working capital credit scheme in Indonesia as well as in the Study Area. As a result, average loan amount of recent 2 years, 1985 and 1986, was about Rp 1,010/farm household/year in the Study Area. This loan amount was about 13% higher than that in South Kalimantan (Rp 950) and 77% higher than that in Indonesia (Rp 610) as seen Table 4.11.

However, Village Cooperatives (KUDs) which are required to extend KUT credit are still weak in the management, and only 16% of KUDs handled this credit in the Study Area in 1986/87 as shown below:

	KUT Handling KUD (No.)	Total KUD in 1986/87 (No.)	% of KUD Handling KUT (%)
Tapin	3	17	17.6
H.S.S.	3	23	13.0
H.S.T.	5	17	29.4
H.S.U.	2	23	8.7
Tabalong	3	18	16.7
Study Area	16	98	16.3
South Kalimantan	28	217	12.9

4.6 Seed Multiplication and Distribution

In order to give high quality extension seed to the farmers, seed multiplication and distribution system has been established in Indonesia as well as in South Kalimantan. Extension seed is multiplied and distributed through the following channels:

Responsibility	Seed Class	Location
AARD	Breeder seed Foundation seed	Food Crops Research Institute
DINAS Food Crops	Stock seed and Extension seed production	Provincial Seed Center, Kab. Seed Station and Seed Grower
Provincial Agriculture service	Extension seed distribution	P.T. Pertani Seed Growers

In South Kalimantan, there are three Provincial Seed Centers and three Kabupaten Seed Stations under the organization of DINAS Food Crops as listed below:

Location	Seed Production
Provincial Seed Center	
* Binuang, Kab. Tapin	Paddy
Barambai, Kab. Balota	Paddy
Papahanan, Kab. Tanah Laut	Palawija
Kabupaten Seed Center	
* Pantai Hambawang, Kab. Hulu Sungai Tengah	Paddy
Bata Tunghu, Kab. Kotabaru	Palawija
Pabahanan, Kab. Tanah Laut	Palawija

*: Located in the Study Area

In recent three years from 1983/84 to 1985/86, annual average production of extension seed was about 570 tons for paddy in South Kalimantan. Supposing that paddy seed is required at the rate of 30kg/ha, this amount of seed production could cover 19,000 ha or about 20% of the paddy harvested area in the Province. The remaining area is considered to be covered by such seeds that those selected from the previous production. The seed production for palawija crops is not a main line in the Province and it was only about 58 tons in 1985/86 in the Province.

Seedlings for estate crops are produced by the Seedling Center located at Binuang in the Study Area. This center is supervised by DINAS Estate crops. The most seedlings produced in this center are distributed to the individual smallholders with object of renewing varieties of old trees. Annual average distribution in 1986/87 and 1987/88 to the Study Area

was about 30,400 seedlings for coconut, 25,000 for coffee, 5,000 for pepper and 2,500 for cacao.

4.7 Farm Input Supply

Supply of fertilizers and agro-chemicals are handled by the government enterprises of P.T. Pusri and P.T. Pertani, respectively. Both regional branches are located in Banjarmasin, and cover two provinces, South Kalimantan and East Kalimantan.

A total amount of fertilizers distributed to South Kalimantan was about 60,200 tons in 1987. Out of this amount, about 25,000 tons or 42% were redistributed by P.T. Pusri itself, 22,000 tons or 37% were by P.T. Pertani and remaining 13,200 tons were by private institutions including KUDs. Through these channels, the Study Area received about 20,500 tons or 34% of the total fertilizers to the Province in 1987 as shown in Table 4.12.

In the total fertilizers given to the Study Area, Urea and TSP had higher shares of about 56% and 36%, respectively in 1987. KCL and ZA supply was small to the Study Area as shown in Table 4.13.

The P.T. Pusri has five storage facilities with a total capacity of about 5,600 tons in the Study Area for the distribution of fertilizers as shown in Table 4.14. Using such facilities, P.T. Pusri distributed about 10,300 tons of fertilizers in 1987 as shown in Table 3.25. About a half of the fertilizers distributed to the Study Area were handled by P.T. Pusri in 1987.

KUDs' farm input supply services have become small in recent years, because of their weak management activities. Although KUDs handled about 17% of the total fertilizers distribution to South Kalimantan in 1984, its share continuously fell off and became only 1% in 1987.

4.8 Farmers' Organization

According to the Law on basic regulations for cooperatives enacted in 1967, the Government has been promoting the establishment of a multipurpose primary agricultural cooperative "Koperasi Unit Desa" (KUD) at the village level to support agricultural development. A village-level development unit of about 600 ha to 1000 ha of lowland rice field may be represented by a KUD. Its functions include agricultural extension, particularly related to the agricultural intensification program; channeling credit to farmers; channeling farm inputs, essential goods such as rice, cooking oil and sugar and processing and marketing of products.

In South Kalimantan, 218 KUDs has been already established, of which 99 KUDs or 45% are located in the Study Area. On an average, there are about 1.9 KUDs in each Kecamatan, and each KUD covers about 14 Desas in the Study Area as shown below:

	Total KUDs (No.)	% of South Kalimantan (%)	% of Study Area Total (%)	KUDs/ Kecamatan (No.)	Desa/ KUDs (No.)
Study Area total	99	(45.4)	(100.0)	1.9	14.1
Tapin	16	-	(16.2)	1.6	8.6
H.S.S.	23	-	(23.2)	2.3	10.1
H.S.T.	18	-	(18.2)	2.3	24.5
H.S.U.	23	-	(23.2)	1.9	17.5
Tabalong	19	-	(19.2)	1.7	9.9
South Kalimantan	218	(100.0)	-	2.0	10.9

Source: KANWIL Cooperative, South Kalimantan, 1987

However, most KUDs are inactive in the Study Area. According to the data from KANWIL Cooperatives, South Kalimantan, only four KUDs or 4% of the total KUDs are classified into "excellent" and 34 KUDs or 34% are "good" in their activities as shown below:

(Unit: % of total)

	Total KUDs	KUDs Activities			
		Excellent	Good	Poor	Others*
Study Area total	100.0	4.0	34.4	39.4	22.2
Tapin	100.0	0.0	18.8	50.0	31.2
H.S.S.	100.0	8.7	26.1	47.8	17.4
H.S.T.	100.0	5.6	38.9	33.3	22.2
H.S.U.	100.0	4.3	65.2	17.4	13.1
Tabalong	100.0	0.0	15.8	52.6	31.6
South Kalimantan	100.0	3.2	26.1	30.3	40.4

*: Not yet classified

Source: KANWIL Cooperative, South Kalimantan, 1987

According to the Agricultural Census 1983, about 10% of the total farm households were member households of KUDs in the Study Area in 1983. Out of the member households, 36% were rendered no services at all from the KUDs, 12% were presented input supply service, 8% were given processing service as shown in Table 4.15.

The KUDs in the Study Area have 39 RMUs with the estimated annual milling capacity of about 25,300 tons. This capacity correspond to about 7% of the total milling capacity in the Study Area as seen in Table 3.24.

As already mentioned above, KUDs handle about 1% of fertilizer distribution and 2% of rice procurement made by DOI. OG in South Kalimantan.

4.9 Operation and Maintenance for Irrigation and Drainage Systems

4.9.1 Sub-DINAS Water Resources Development

Within the Provincial Public Works (DPU) South Kalimantan, the Sub-DINAS Water Resources Development (Sub-DINAS WRD) is responsible for operating and maintaining the public irrigation and drainage systems. The chief of the Sub-DINAS WRD is administratively responsible to the Provincial Governor through the chief of DPU, but for all technical and personnel matters, the chief of Sub-DINAS WRD comes under the jurisdiction of DGWRD. The Sub-DINAS WRD, at its provincial headquarters, includes sections for planning and programming, implementation, and operation and maintenance (O&M). The O&M section has functions in preparing operation plans and guidelines and O&M budgets, and in ensuring adequate O&M in the Province. The organization structure of Sub-DINAS WRD is illustrated on Figure 4.3.

The O&M for the main irrigation and drainage systems is carried out mostly by the Cabang DINAS WRD located in each Kabupaten in the Study Area. Under the head of each Cabang DINAS WRD, about three Inspectors (Pengamat) are assigned in order to make O&M services at Kecamatan level with the average command area of about 4,560 ha as shown in Table 4.16. Further under each Inspector, about two Overseers (Juru) are assigned with the average command area of about 1,950 ha. Though each Overseer is generally assisted by gate-keepers in the most regions in Indonesia, they are scarcely arranged in the Study Area. Only 32 gate-keepers are available in Hulu Sungai Utara, and no such personnel is arranged in the other four Kabupatens in the Study Area as also shown in Table 4.16.

The Cabang DINAS WRD is required, as part of its main function, to estimate crop areas, stages of crop growth, crop water requirements, field application and conveyance losses, and water inflows and outflows in off takes and structures. These activities require more staffs and higher technical capabilities than are available at present.

4.9.2 Water Users' Association

In 1975, recognizing the importance of efficient water management for tertiary networks, the Government of Indonesia decreed the establishment of Water Users' Associations (WUAs) at the village level. As main functions, WUAs are proposed to: 1) manage water distribution properly and equitably for every part of the field; 2) maintain the irrigation system regularly; 3) rehabilitate the damaged facilities; 4) propagate agricultural technique especially on cultivation and irrigation; 5) collect contributions and funds for maintenance and development of the irrigation facilities; and 6) set realize the regulations and punishments to its member farmers.

In the Study Area, however, the WUAs are insufficient in number and inactive at present as shown in Table 4.17. The total establishment of WUAs is 71 units with the membership of 5,700 farmers which is only about 4% of the total farm households in the Study Area. Among the existing WUAs, only about 9% are active, 54% are semi-active and the rest are inactive. Such lack or inactivity of WUAs may be due to poor tertiary system development in the Province.

5. RECOMMENDATION

5.1 Food Crops

The Study Area is evaluated as the production center of rice in South Kalimantan, and this Province itself plays an important role in fulfilling local demands in the other two neighbor provinces, i.e. Central and East Kalimantan (see Chapter 4, Annex A). However, the productivity of rice is still low in the study area, and some study reports have pointed out its lower economic profitability in South Kalimantan comparing with that in other regions in Indonesia. In order to improve the farmers economy as well as regional economy, the productivity has to be increased by taking necessary measures.

The result of food balance projection indicates the necessity of continuous increase of palawija crops such as maize, soybeans and groundnuts, although these crops are not main income sources of the farmers in the Study Area at present. The production surplus of these crops would also improve the farmers economy and supplement the increasing demand in South Kalimantan.

Root crops, vegetables and fruits are expected to be insufficiently produced in the future in the Study Area and South Kalimantan. Production increase of these crops would have to be achieved considering the crop profitability, marketing potentiality and crop agronomic requirement. For example, crop productivity of root crops are generally low and marketing potentiality of vegetables is usually high in the suburbs of urban areas.

Taking the above discussions into consideration, the recommendation to be drawn for the food crop development are as follows:

- 1) Rehabilitation and upgrading of existing irrigation and drainage systems,
- 2) Upgrading and development of reclamation of swamps in the promising areas keeping pace with the increasing demand of food crops,
- 3) Improvement of the operation and maintenance of the above works,
- 4) Further promotion of crop diversification particularly in the wet paddy field through the strengthening of intensification program for palawija crops, and
- 5) Supplying of more comprehensive and effective institutional agricultural services.

5.2 Estate Crops

As pointed out in Chapter 2, Annex A, further growth of non-oil exports would become more important in the Indonesia's economy in the future. In the non-oil exports, agricultural commodities particularly estate crops have been playing an important role. From this point of view, it is required to increase the production of estate crops in the Study Area. Production increase of these crops would also improve the farmers economy.

Taking into account all the study results including the above discussions, the recommendation for estate crop development are to be as follows:

- 1) Completion of on-going NES development which has been stopped due to the Indonesia's budget austerity,
- 2) More extensive rehabilitation of the existing smallholders and private estates,
- 3) Improvement of poor rural processing facilities which increase processing losses and make quality low,
- 4) Promotion of further development of NES, PMU and private estates as far as areas are available, and
- 5) Strengthening of institutional services in order to realize the above development works.

5.3 Agricultural Supporting Services

Based on the analyses on the present conditions of agricultural supporting services made in Chapter 4, the requirement for further improvement are evaluated by service field and crop subsector.

In order to make clear decision in the evaluation, the following criteria are established:

- Requirement A : Present service activities are still behind the national level and further improvement is urgently required.
- Requirement B : Present service activities are still behind the national level and further improvement is required for the future.
- Requirement C : Present level of service activities are continuously required.

As a result, the requirement for further improvement of agricultural supporting services in the Study Area is evaluated as shown below:

	Research/ Breeding	Extension	Credit	Input Supply	Marketing
Wet land paddy	A	B	A	A	A
Root crops	B	B	C	C	C
Palawija Crops	A	A	B	A	A
Vegetables	B	B	B	B	B
Fruit trees	B	B	C	C	B
Inland fishery	A	B	C	C	A
Aquaculture	B	B	B	B	B
Estate crops	B	A	A	A	A
Livestock	B	B	A	B	B

As seen in the above, further improvement is urgently required in various service fields particularly for crop subsectors of wet land paddy, palawija and estate crops. These urgently required services are considered to be mainly composed of research, extension, credit and cooperatives.

In the research works, development of wet land paddy varieties suitable for swamp areas with multiple disease and insect resistance should be further strengthened. For the crop diversification, continuous research on new cropping system and double cropping would be intensively required. In order to conserve the resources of inland fishery, strengthening of environmental study is also required.

The arrangement of extension agents are well in the Study Area, if compared with that in Indonesia as a whole. However their technical abilities have to be further developed to make more appropriate services to the farmers. Approach to the crop diversification should be strengthened particularly to soybeans and maize. In the field of estate crops, smallholder rubber productivity and quality should be improved, particularly through the strengthening of extension services.

In the credit services, further development of KUT program is urgently required through the strengthening of KUDs management abilities. Such working capital credit is considered to be important particularly for small farmers. Investment credit is considered to be more important than working capital for the future agricultural development for the rehabilitation of smallholder rubber plantation, development of tertiary system in irrigation and drainage project, etc.

With the object of improving KUDs management ability, some advantages are already available, e.g. higher rice pricing for purchasing and interest premium for production loan. Under such subsidized program, KUDs' management ability in input supply and marketing services should be strengthened particularly for rice and palawija crops.

5.4 O&M for Pilot Schemes

In the light of high agricultural development potentials in the Study Area, the successful operation of the proposed five pilot schemes are essential. The success in pilot schemes would induce further development of the another sub-projects and provide many experiences to be adaptable to the next sub-projects.

5.4.1 Organizational arrangement

The organizational arrangement recommended for the efficient O&M for the pilot schemes is illustrated as shown in Figure 5.1. As seen in the figure, the organizational arrangement is almost the same as that at present. The Sub-DINAS Water Resources Development would take responsibility for preparation of O&M operation plans, guidelines and O&M budgets and ensuring adequate O&M. The Water Resources Development section in Cabang DINAS, located in each Kabupaten, would take direct responsibility for O&M of the proposed pilot scheme through an Inspector to be recruited at Kecamatan level. Each Inspector would be assisted by one to five Overseers to be recruited at village level. Each overseer would be responsible for gate operation, recording hydrologic and cropping data, arranging the emergency maintenance of main and secondary canals, persuading farmers through their village chief and water master to maintain tertiary and quaternary canals, and to agree on planting dates for rational water distribution and management. Each Overseer would be assisted by gate-keepers and a few laborers.

In addition, in the organizational arrangement, more strong and active coordination among the Provincial Public Works (DPU) and Agricultural Services is strongly required to make efficient O&M not only for the pilot schemes, but also for the existing systems, since the Irrigation Committees which comprise representatives from DPU, Provincial/Kabupaten governments and Agricultural Service are not active at present both at Province and Kabupaten levels. The first priority of Irrigation Committees should be given to the development of WUAs in the light of their weakness, in spite of the importance of O&M for tertiary and quaternary systems.

Through the said coordination, WUAs should be developed including some additional establishment in the tertiary system which has no WUA. The WUA management would consist of a Chairman, Deputy Chairman, Secretary, Treasurer and Water Master and responsible for one tertiary unit of about 100 ha. Major members of WUA would be elected by WUA members who own and rent land within the tertiary unit.

The recommended number of WUAs should be developed in each pilot scheme is as follows:

Kabupaten/ Pilot Scheme	Area (ha)	WUA (No.)
Tabalong I-Jaro Bawah	200	2
H.S.U. P-Alabio	4,500	45
H.S.T. D-R. Taras	300	3
H.S.S. D-R. Negara	5,200	52
Tapin D-S. Tapin Gadun	1,000	10
Total	11,200	112

I: Irrigation scheme P: Polder scheme D: Drainage scheme

The WUA managements would be supported by the Inspectors and Overseers from Cabang DINAS of PU and extension staffs from RECs. However, most appropriate support system to be adaptable to the Study Area should be developed through the operation of proposed pilot schemes.

5.4.2 Staffing arrangement

For the efficient O&M of the proposed pilot schemes, the staffing arrangement to be required is as follows:

Kabupaten/ Pilot Scheme	Area (ha)	Inspector (No.)	Overseer (No.)	Gate- keeper (No.)
Tabalong I-Jaro Bawah	200	1	1	1
H.S.U. P-Alabio	4,500	1	5	23
H.S.T. D-R. Taras	300	1	1	2
H.S.S. D-R. Negara	5,200	1	5	26
Tapin D-S. Tapin Gadun	1,000	1	1	5
Total	11,200	5	13	57

I: Irrigation scheme P: Polder scheme D: Drainage scheme

The staffing requirement is estimated by applying the average command area of 1,000 ha for each Overseer and 200 ha for each gate-keeper. An Inspector is required to be assigned for each pilot scheme and would take responsibility for daily O&M activities together with Overseers and gate-keepers.

In addition to the above staffing, in the Sub-DINAS Water Resources Development, at least one O&M expert to be internationally recruited is recommended to arrange particularly for the O&M of pilot schemes.

TABLES

Table 2.1 Area Harvested, Production and Yield of Paddy in Indonesia

Year	Area Harvested ('000 ha)	Average Yield (tons/ha)	Paddy Output ('000 tons)	Rice Output a/ ('000 tons)
1969	8,014	2.2	18,013	12,249
1970	8,135	2.4	19,324	13,140
1971	8,324	2.4	20,182	13,724
1972	7,898	2.5	19,386	13,182
1973	8,404	2.6	21,481	14,607
1974	8,509	2.6	22,164	15,276
1975	8,495	2.6	22,331	15,185
1976	8,369	2.8	23,301	15,845
1977	8,360	2.8	23,347	15,876
1978	8,929	2.9	25,772	17,525
1979	8,804	3.0	26,283	17,872
1980	9,005	3.3	29,652	20,163
1981	9,382	3.5	32,774	22,286
1982	8,988	3.7	33,584	22,837
1983	9,162	3.9	35,303	24,006
1984	9,764	3.9	38,136	25,932
1985	9,902	3.9	39,033	26,542
1986	9,988	4.0	39,727	27,014
1987	9,922	4.0	40,078	27,253
1988	9,875	4.2	41,458	28,191

Rate of Increase (% p.a.)

1969-73	1.2	3.2	4.5
1974-78	1.2	2.3	3.5
1979-83	1.0	6.6	7.7
1984-88	0.3	1.8	2.1

Remarks: a/ Estimated on the basis of a conversion factor of 0.68 from paddy into rice.

Source: Central Bureau of Statistics for 1969-1986
Ministry of Agriculture for 1987&88

Table 2.2 Composition of Agricultural GRDP/GDP in South Kalimantan and Indonesia at Current Market Prices

Commodity	South Kalimantan a/				GDP in Indonesia b/			
	GRDP		Composition		GDP		Composition	
	(Rp billion)		(%)		(Rp billion)		(%)	
	1975	1985	1975	1985	1975	1985	1975	1985
Farm food crops	27	190	53.7	53.7	2,555	14,138	63.8	62.4
Farm non-food crops	n.a	n.a	n.a	n.a	358	3,049	8.9	13.5
Estate crops	4	23	8.0	6.4	184	624	4.6	2.8
Livestock products	5	41	9.5	11.6	303	2,305	7.6	10.2
Forestry	4	34	8.0	9.7	413	977	10.3	4.3
Fishery	10	66	20.8	18.7	191	1,557	4.8	6.9
Total	50	353	100.0	100.0	4,004	22,650	100.0	100.0

Source: a/; Statistics Office, South Kalimantan Province
b/; Central Bureau of Statistics

Table 3.1 Farm Households and Farm Population in the Study Area in 1985

Kabupaten	Farm Population			Working Population ('000)	Farm Households (No.)	Average Family Size (prs/family)	Working Popu. per Fam Household (prs/family)
	Male ('000)	Female ('000)	Total ('000)				
Study Area	324.0	351.3	675.3	270.1	158,700	4.25	1.70
Tapin	46.4	48.5	94.9	38.0	22,900	4.15	1.66
H.S. Selatan	57.5	62.4	119.9	48.0	30,520	3.93	1.57
H.S. Tengah	77.9	88.0	165.9	66.4	39,080	4.24	1.70
H.S. Utara	95.8	103.9	199.8	79.9	44,630	4.48	1.80
Tabalong	46.5	48.4	94.9	37.9	21,570	4.04	1.76
South Kalimantan	755.8	762.4	1518.2	607.3	334,400	4.54	1.82
Total Indonesia	44,790	44,347	92,993.8	34,142	20,344,500	4.57	1.68

Source: Table 3.1, Annex A

Table 3.2 Number of Farm Households by Subsector in the Study Area, South Kalimantan and Indonesia in 1983

Study Area	Farm Household	Food Crops Household		Small-holders Estates Household	Fish Cultivation: Household in Pond, etc.	Fishcatching Household			Livestock Breeding Household	(Unit: '000 households)		
		Paddy and Other Main Crops	Horti-culture			Brackish Water	Marine Fishery	Lake, River, etc.		Labour/Hired Manager Household		
										Labour	Hired Manager	
Tapin	22.0	20.5	9.3	11.5	0.2	0.0	0.0	0.0	19.8	17.3	13.4	2.9
H.S.Selatan	30.1	27.3	9.6	15.2	0.2	0.0	0.0	0.0	2.7	2.9	3.2	0.3
H.S.Tengah	38.7	35.9	8.5	20.0	0.3	0.0	0.0	0.0	5.2	2.4	2.9	1.0
H.S.Utara	44.1	39.9	7.9	17.3	0.3	0.0	0.0	0.0	2.1	4.9	4.2	1.1
Tabalong	20.9	17.9	5.6	15.6	0.2	0.0	0.0	0.0	9.2	5.1	1.9	0.4
South Kalimantan	319.4	286.4	106.3	158.8	2.5	0.2	9.0	31.1	37.2	28.7	6.9	6.9
Indonesia	19,504.8	16,347.6	8,290.8	11,744.0	701.5	57.4	490.0	232.3	4,483.4	5,032.7	369.1	369.1
Distribution by sub-sector (% of total farm households)												
Study Area	100.0	90.8	26.3	51.1	0.8	0.0	0.0	12.7	11.1	8.6	1.8	1.8
Tapin	100.0	93.3	42.5	52.5	1.1	0.0	0.0	12.3	13.1	14.7	1.3	1.3
H.S.Selatan	100.0	90.8	31.9	50.4	0.6	0.0	0.0	17.4	8.1	9.7	3.2	3.2
H.S.Tengah	100.0	92.7	21.9	51.7	0.8	0.0	0.0	5.3	12.8	10.9	2.9	2.9
H.S.Utara	100.0	90.4	18.0	39.3	0.7	0.0	0.0	20.9	11.5	4.4	0.8	0.8
Tabalong	100.0	85.8	26.9	74.6	1.0	0.0	0.0	2.7	9.6	5.2	0.7	0.7
South Kalimantan	100.0	89.7	33.3	49.7	0.8	0.1	2.8	9.7	11.7	9.0	2.1	2.1
Indonesia	100.0	83.8	42.5	60.2	3.6	0.3	2.5	1.2	23.0	25.8	1.9	1.9

Source: Agricultural Census 1983, CBS

Table 3.3 Land Tenure and Land Holding in the Study Area and South Kalimantan

	Land Controlled			Farm Household			Ave. Size of Land Controlled		
	Owned (1)	Tenant (ha) (2)	Total (3)	Owner (4)	Land Con- trolled (No.) (5)	Total (6)	Owner (1/4)	Land Con- trolled (ha) (3/5)	Total (3/6)
Study Area	99,948	22,746	122,694	138,224	148,320	155,698	0.72	0.83	0.79
Tapin	22,867	6,112	28,979	19,540	21,445	21,956	1.17	1.35	1.32
H.S.Selatan	16,298	3,657	19,955	26,219	28,345	30,053	0.62	0.70	0.66
H.S.Tengah	19,218	6,089	25,307	33,087	36,560	38,699	0.58	0.69	0.65
H.S.Utara	27,531	5,424	32,955	40,707	42,845	44,082	0.68	0.77	0.75
Tabalong	14,034	1,464	15,498	18,671	19,125	20,908	0.75	0.81	0.74
South Kalimantan	303,823	41,734	345,557	266,062	287,465	319,356	1.14	1.20	1.08
Distribution (% of total)									
Study Area	81.5	18.5	100.0	88.8	95.3	100.0	-	-	-
Tapin	78.9	21.1	100.0	89.0	97.7	100.0	-	-	-
H.S.Selatan	81.7	18.3	100.0	87.2	94.3	100.0	-	-	-
H.S.Tengah	75.9	24.1	100.0	85.5	94.5	100.0	-	-	-
H.S.Utara	83.5	16.5	100.0	92.3	97.2	100.0	-	-	-
Tabalong	90.6	9.4	100.0	89.3	91.5	100.0	-	-	-
South Kalimantan	87.9	12.1	100.0	83.3	90.0	100.0	-	-	-

Source: 1983 Agricultural Census, CBS

Table 3.4 Number of Farm Households by Holding Size

	Size of Land Controlled										Total
	Less than 0.05 ha	0.05 - 0.09 ha	0.10 - 0.24 ha	0.25 - 0.49 ha	0.50 - 0.74 ha	0.75 - 0.99 ha	1.00 - 1.99 ha	2.00 - 2.99 ha	3.00 ha & over	(Unit: No.)	
Study Area	5,415	5,362	22,509	45,047	26,449	15,098	22,621	7,337	5,860	155,698	
Tapin	372	247	1,048	4,551	3,125	2,003	5,228	2,673	2,709	21,956	
H.S.Selatan	1,488	1,238	4,779	9,560	5,378	2,395	3,609	970	636	30,053	
H.S.Tengah	784	1,095	5,792	12,611	7,886	4,449	4,579	909	594	38,699	
H.S.Utara	2,409	1,597	6,923	12,188	7,132	4,774	6,196	1,593	1,270	44,082	
Tabalong	362	1,185	3,967	6,137	2,928	1,477	3,009	1,192	651	20,908	
South Kalimantan	10,976	9,315	32,071	66,019	45,883	26,653	71,420	34,937	22,082	319,356	
Distribution (% of total)											
Study Area	3.5	3.4	14.5	28.9	17.0	9.7	14.5	4.7	3.8	100.0	
Tapin	1.7	1.1	4.8	20.7	14.2	9.1	23.8	12.2	12.3	100.0	
H.S.Selatan	5.0	4.1	15.9	31.8	17.9	8.0	12.0	3.2	2.1	100.0	
H.S.Tengah	2.0	2.8	15.0	32.6	20.4	11.5	11.8	2.3	1.5	100.0	
H.S.Utara	5.5	3.6	15.7	27.6	16.2	10.8	14.1	3.6	2.9	100.0	
Tabalong	1.7	5.7	19.0	29.4	14.0	7.1	14.4	5.7	3.1	100.0	
South Kalimantan	3.4	2.9	10.0	20.7	14.4	8.3	22.4	10.9	6.9	100.0	

Source: 1983 Agricultural Census, CBS

Table 3.5 Harvest Areas, Productions and Yields of Major Crops in the Study Area, 1982-1986

	1982	1983	1984	1985	1986	5 Years Average	Growth Rate (1982-86)
<i>a/</i>							
<u>Area Harvested</u>	-----('000 ha)-----						----(% p.a.)----
Paddy (wet land)	111.4	108.2	117.2	119.8	123.8	116.11	2.7
Paddy (dry land)	13.8	6.7	15.1	15.1	12.8	12.68	-1.9
Maize	1.9	3.3	3.2	1.9	2.2	2.53	3.5
Cassava	1.6	1.5	1.9	1.7	1.9	1.71	4.3
Sweet potato	1.3	0.7	0.7	1.1	1.4	1.06	3.0
Soybeans	0.2	0.5	0.5	0.9	1.3	0.68	59.4
Groundnuts	3.0	3.9	3.6	3.6	4.4	3.71	10.2
Mungbeans	0.2	0.4	0.3	0.4	0.7	0.40	33.7
Vegetables	2.1	3.7	2.5	2.4	2.8	2.71	8.1
Rubber	60.0	64.4	67.0	73.0	78.9	68.65	7.1
Coconut	20.5	20.7	20.2	22.5	22.5	21.28	2.3
Coffee	2.1	2.1	2.0	2.3	2.5	2.23	3.9
Cloves	3.3	3.2	3.3	3.8	3.8	3.50	3.9
Pepper	0.2	0.3	0.4	0.6	0.6	0.43	27.9
Banana	0.8	1.2	1.3	1.7	1.7	1.33	22.9
Rambutan	0.3	0.2	0.4	0.5	0.1	0.30	-18.0
Citrus	0.3	0.3	0.4	0.3	0.3	0.34	2.0
<u>Production</u>	-----('000 tons)-----						----(% p.a.)----
Paddy (wet land)	326.4	378.1	418.3	433.1	421.9	395.57	6.6
Paddy (dry land)	23.5	12.3	23.8	26.4	23.6	21.93	0.1
Maize	1.7	2.5	2.3	1.5	2.0	1.99	4.3
Cassava	11.4	10.0	13.5	12.9	14.4	12.41	6.1
Sweet potato	6.3	3.8	3.6	5.6	7.2	5.28	3.3
Soybeans	0.1	0.3	0.3	0.9	1.2	0.57	76.9
Groundnuts	2.5	3.0	3.0	3.5	4.4	3.27	15.1
Mungbeans	0.1	0.2	0.2	0.3	0.4	0.22	36.0
Vegetables	2.2	6.2	4.2	4.5	6.4	4.69	31.1
Rubber	23.2	23.6	26.0	25.0	26.3	24.81	3.2
Coconut	14.1	14.1	14.1	14.9	15.4	14.51	2.2
Coffee	0.5	0.5	0.5	0.5	0.6	0.50	4.5
Cloves	0.1	0.2	0.2	0.1	0.1	0.15	3.6
Pepper	0.1	0.1	0.1	0.2	0.2	0.15	6.9
Banana	2.4	2.8	4.3	7.0	8.7	5.04	37.6
Rambutan	0.6	0.3	2.4	2.1	0.5	1.18	-2.1
Citrus	0.3	0.9	2.4	1.5	1.4	1.30	43.2
<u>Yield</u>	----- (kg/ha) -----						----(% p.a.)----
Paddy (wet land)	2,929	3,493	3,569	3,614	3,406	3,407	3.9
Paddy (dry land)	1,704	1,843	1,582	1,754	1,843	1,729	2.0
Maize	858	751	720	776	883	786	0.7
Cassava	7,143	6,737	7,139	7,432	7,624	7,236	1.6
Sweet potato	4,950	5,072	4,876	5,042	5,010	4,992	0.3
Soybeans	623	611	661	942	945	836	11.0
Groundnuts	827	778	828	961	985	881	4.5
Mungbeans	546	518	538	587	585	561	1.7
Vegetables	1,045	1,678	1,687	1,822	2,262	1,731	21.3
Rubber	387	366	387	342	334	361	-3.7
Coconut	685	682	696	663	685	682	0.0
Coffee	220	227	240	205	226	223	0.6
Cloves	38	48	54	34	38	42	-0.3
Pepper	598	411	372	258	292	347	-19.7
Banana	3,170	2,317	3,428	4,195	4,986	3,798	12.0
Rambutan	1,969	1,710	6,131	4,238	3,517	3,886	13.5
Citrus	944	2,839	5,968	4,451	4,298	3,793	31.5

a/: Area planted for estate crops

Source: Statistical Yearbook of South Kalimantan 1983...1987, Statistics Office, South Kalimantan

Table 3.6 Harvested Areas, Productions and Yields of Major Crops in South Kalimantan, 1982-1986

	1982	1983	1984	1985	1986	5 Years Average	Growth Rate (1982-86)
<i>ha</i>							
-----('000 ha)-----							
Area Harvested							(% p.a.)
Paddy (wet land)	286	277	290	300	336	298	4.1
Paddy (dry land)	36	24	45	40	64	42	15.7
Maize	5	10	8	6	16	9	33.5
Cassava	5	7	9	10	7	8	9.1
Sweet potato	2	2	2	2	2	2	3.9
Soybeans	1	2	2	3	5	3	53.3
Groundnuts	6	11	11	9	11	10	15.1
Rubber	72	80	86	92	100	86	8.4
Coconut	44	46	46	51	51	48	4.0
Coffee	6	7	6	6	6	6	1.6
Cloves	8	9	9	10	10	9	5.4
Pepper	1	1	1	2	2	1	9.6
-----('000 ha)-----							
Production							(% p.a.)
Paddy (wet land)	684	754	816	866	876	799	6.4
Paddy (dry land)	58	36	73	74	74	63	6.2
Maize	4	8	7	5	8	7	20.4
Cassava	31	46	61	80	63	56	19.6
Sweet potato	10	11	8	11	13	10	5.8
Soybeans	1	1	1	3	5	2	69.3
Groundnuts	5	9	9	8	10	8	19.7
Rubber	26	26	29	28	30	28	3.5
Coconut	28	29	31	33	33	31	3.7
Coffee	1	1	1	1	1	1	9.3
Cloves	0	0	0	0	0	0	7.4
Pepper	0	0	1	1	1	0	9.1
-----('000 ha)-----							
Yield							(% p.a.)
Paddy (wet land)	2,391	2,724	2,813	2,888	2,609	2,684	2.2
Paddy (dry land)	1,636	1,506	1,614	1,861	1,164	1,514	-8.9
Maize	798	813	857	802	529	717	-10.8
Cassava	5,873	6,215	6,927	8,080	8,482	7,242	9.6
Sweet potato	4,821	5,145	5,145	5,277	5,197	5,118	1.9
Soybeans	613	598	676	851	911	800	10.4
Groundnuts	806	812	857	910	942	870	4.0
Rubber	356	325	336	300	296	320	-4.8
Coconut	646	619	667	643	638	642	-0.3
Coffee	167	152	225	214	224	195	7.6
Cloves	37	43	42	40	40	41	1.9
Pepper	366	329	357	329	360	348	-0.4

a/: Area planted for estate crops

Source: Statistical Yearbook of South Kalimantan 1983..1987, Statistics Office, South Kalimantan

Table 3.7 Harvested Areas, Productions and Yields of Major Crops in Indonesia, 1981-1985

	1981	1982	1983	1984	1985	5 Years Average	Growth Rate (1981-85)
<i>a/</i>							
Area Harvested	('000 ha)						(p.a)
Paddy (wet land)	8,191	7,873	7,987	8,547	8,756	8,271	1.7
Paddy (dry land)	1,191	1,116	1,176	1,216	1,147	1,169	-1.0
Maize	2,955	2,061	3,002	3,086	2,440	2,709	4.9
Cassava	1,388	1,324	1,221	1,350	1,292	1,315	-1.8
Sweet potato	275	220	280	264	256	259	-1.8
Soybeans	810	608	481	538	510	589	12.3
Groundnuts	508	461	481	538	510	499	0.1
Rubber	2,444	2,466	2,564	2,615	2,656	2,549	2.1
Coconut	2,752	2,809	2,810	2,954	3,002	2,865	2.2
Coffee	792	802	808	826	875	821	2.5
Cloves	495	511	552	579	620	551	5.8
Pepper	77	77	78	81	81	79	1.4
Production	('000 ha)						(p.a)
Paddy (wet land)	30,989	31,776	33,294	36,017	37,027	33,821	4.6
Paddy (dry land)	1,785	1,808	2,009	2,119	2,006	1,945	2.9
Maize	4,509	3,235	5,087	5,288	4,556	4,535	0.3
Cassava	13,301	12,988	12,103	14,167	14,073	13,326	1.4
Sweet potato	2,094	1,676	2,213	2,156	2,228	2,073	1.6
Soybeans	704	521	536	769	865	679	5.3
Groundnuts	475	437	460	535	542	490	3.4
Rubber	963	900	1,007	1,033	1,060	993	2.4
Coconut	1,812	1,718	1,604	1,750	1,800	1,737	-0.2
Coffee	295	281	305	315	335	306	3.2
Cloves	40	32	41	49	58	44	9.7
Pepper	39	34	46	46	46	42	4.2
Yield	('000 ha)						(p.a)
Paddy (wet land)	3,783	4,036	4,169	4,214	4,229	4,089	2.8
Paddy (dry land)	1,499	1,620	1,709	1,742	1,749	1,664	3.9
Maize	1,526	1,569	1,694	1,713	1,867	1,674	5.2
Cassava	9,586	9,812	9,914	10,491	10,894	10,135	3.2
Sweet potato	7,617	7,632	7,898	8,170	8,700	8,007	3.4
Soybeans	869	857	1,116	1,430	1,696	1,152	18.2
Groundnuts	935	947	957	995	1,063	981	3.3
Rubber	394	365	393	395	399	389	0.3
Coconut	658	612	571	592	600	606	-2.4
Coffee	372	350	377	381	383	373	0.7
Cloves	81	63	74	85	94	80	3.7
Pepper	509	442	589	569	569	536	2.8

a/: Area planted for estate crops

Source: Statistical Yearbook of Indonesia 1986, CBS

Table 3.8 Production Share of Agricultural Products of the Study Area in South Kalimantan and Indonesia

Crops	Production			Share of Study Area in;		Share of South Kal. in Indonesia (%)
	Indonesia ('000 tons)	South Kal. ('000 tons)	Study Area ('000 tons)	Indonesia (%)	South Kal. (%)	
<u>Food Crops</u>						
Rice	24,320	586.32	283.90	1.17	48.42	2.41
Maize	4,535	6.52	1.99	0.04	30.52	0.14
Cassava	13,326	56.05	12.41	0.09	22.14	0.42
Sweet potato	2,073	10.50	5.28	0.25	50.29	0.51
Soybeans (shelled)	679	2.01	0.57	0.08	28.36	0.30
Groundnuts (shelled)	490	8.31	3.27	0.67	39.35	1.70
<u>Fisheries</u>						
Saltwater fish	1,621	40.30	-	-	-	2.49
Freshwater-fish	535	56.54	39.78	7.44	70.36	10.57
<u>Meat and Dairy</u>						
Meat	685	8.63	4.42	0.65	51.22	1.26
Eggs	324	14.13	8.09	2.50	57.25	4.36
Milk a/	143	0.03	-	-	-	0.02
<u>Estate Crops</u>						
Rubber	993	27.61	24.81	2.50	89.86	2.78
Coconut	1,737	30.65	14.51	0.84	47.34	1.76
Coffee	306	1.15	0.50	0.16	43.48	0.38
Cloves	44	0.38	0.15	0.34	39.47	0.86
Pepper	42	0.49	0.15	0.36	30.61	1.17
<u>Forestry</u>						
Log b/	14,848	729.40	n.a	-	-	4.91
<u>Memorandum items</u>						
Population in 1985 ('000)	164,047	2,315	890	0.54	38.44	1.41
Farm households in 1983 ('000)	20,345	334	159	0.78	47.46	1.64
Area (km ²)	1,919,443	36,986	12,654	0.66	34.21	1.93

a/ In liters million

b/ In '000 cubic meters

- Source: - Food crops, fisheries, meat and dairy, and estate crops in Indonesia; Five years average from 1981-85 based on the Supplement to the President's Report to Parliament, August 15 1986, and Draft State Budget, 1986/87
- Forestry in Indonesia; Three years average from 1982/83-1984/85 based on the Statistical Yearbook of Indonesia 1986, CBS
- Food crops and estate crops in South Kalimantan and the Study Area; Five years average from 1982-86 based on the Statistical Yearbook of South Kalimantan, 1983-87, Statistics Office, South Kalimantan Province
- Fisheries in South Kalimantan and the Study Area; Five years average from 1982-86 based on the data from DINAS Fishery, South Kalimantan Province
- Meat and dairy in South Kalimantan and Study Area; Four years average from 1983-86 based on the Statistics on Livestock 1988, Directorate General of Livestock, Ministry of Agriculture
- Forestry in South Kalimantan; Three years average from 1982/83-1984/85 based on the "Forestry Statistics 1985/86", KANWIL Forestry, South Kalimantan

Table 3.9 Comparison of Yield Levels of Major Crops and Livestock Population per 100 Farm among the Study Area, South Kalimantan and Indonesia

	Unit Yield/Livestock population			Comparison (Indonesia = 100)		
	Indonesia	South Kal.	Study Area	Indonesia	South Kal.	Study Area
<u>Food Crops (kg/ha)</u>						
Wet land paddy	4,089	2,684	3,407	100	66	83
Dry land paddy	1,664	1,514	1,729	100	91	104
Maize	1,674	717	786	100	43	47
Cassava	10,135	7,242	7,236	100	71	71
Sweet potato	8,007	5,118	4,992	100	64	62
Soybeans	1,152	800	836	100	69	73
Groundnuts	981	870	892	100	89	91
<u>Estate Crops (kg/ha)</u>						
Rubber	389	320	361	100	82	93
Coconut	606	642	682	100	106	113
Coffee	373	195	223	100	52	60
Cloves	80	41	42	100	51	53
Pepper	536	348	347	100	65	65
<u>Livestock (heads/100 farm households)</u>						
Cattle	45.4	21.2	15.2	100	47	33
Buffaloes	14.8	15.0	11.3	100	101	76
Pigs	26.0	2.7	5.3	100	10	20
Goats	48.8	17.3	22.8	100	36	47
Sheep	23.9	3.3	5.8	100	14	24
Chickens	688.7	736.3	1,551.5	100	107	225
- Improved	164.1	166.0	76.6	100	101	47
- Traditional	524.6	1,238.0	1,475.0	100	236	281
Ducks	81.0	626.5	1,030.7	100	773	1,272

Source: Tables 3.5, 3.6, 3.7 and 3.17

Table 3.10 Harvest Areas, Productions and Yields of Food Crops by Kabupaten in the Study Area

	Tapan			H.S.Selatan			H.S.Tengah			H.S.Utara			Tabalong			Total		
	Area (ha)	Pro- duction (ton)	Unit Yield (ton/ha)	Area (ha)	Pro- duction (ton)	Unit Yield (ton/ha)	Area (ha)	Pro- duction (ton)	Unit Yield (ton/ha)	Area (ha)	Pro- duction (ton)	Unit Yield (ton/ha)	Area (ha)	Pro- duction (ton)	Unit Yield (ton/ha)	Area (ha)	Pro- duction (ton)	Unit Yield (ton/ha)
Paddy (wet land)	27,756	88,608	3.19	20,147	78,546	3.90	23,537	97,958	4.16	29,936	85,037	2.84	4,738	45,421	3.08	116,114	395,570	3.41
Paddy (dry land)	3,123	6,468	2.07	1,560	3,162	2.03	1,818	3,650	2.01	3,526	4,549	1.29	2,654	4,106	1.55	12,681	21,932	1.73
Total paddy	30,879	95,076	3.08	21,707	81,708	3.76	25,355	101,608	4.01	33,462	89,586	2.68	17,392	49,527	2.85	128,795	417,502	3.24
Milze	1,156	805	0.70	501	353	0.76	182	147	0.81	427	448	1.05	264	206	0.78	2,530	1,989	0.79
Cassava	223	2,231	10.00	383	1,903	4.97	511	2,371	4.65	476	3,447	7.24	321	2,456	7.65	1,714	12,408	7.24
Sweet potato	45	344	8.00	463	2,267	4.90	89	410	4.61	275	1,372	4.99	187	883	4.72	1,057	5,276	4.99
Soybeans	249	261	1.05	46	32	0.70	92	73	0.79	141	107	0.76	156	99	0.63	684	572	0.84
Groundnuts	2,280	2,047	0.90	745	663	0.89	174	152	0.87	335	262	0.78	178	145	0.81	3,712	3,269	0.88
Mungbeans	59	34	0.58	90	48	0.53	81	49	0.60	77	43	0.56	92	49	0.53	399	223	0.56
Vegetables	342	707	2.07	521	959	1.84	325	1,251	3.85	798	702	0.88	622	1,067	1.72	2,708	4,686	1.73
Sub-total	35,231	101,505		24,536	87,963		26,609	106,061		35,991	95,967		19,212	54,429		141,599	445,925	
Banana	317	1,304	4.11	87	667	7.67	156	921	5.90	584	1,694	2.90	182	455	2.50	1,326	5,041	3.80
Rambutan	59	185	3.14	82	41	1.72	86	766	8.91	38	43	1.13	38	44	1.16	303	1,179	3.89
Citrus	18	66	3.67	6	16	2.67	300	1,188	3.96	17	20	1.18	3	14	4.67	344	1,304	3.79
Other fruits	68	337	4.96	43	184	4.28	187	714	3.82	174	329	1.89	91	323	3.55	563	1,887	3.35
Sub-total	462	1,892		218	1,008		729	3,589		813	2,086		314	836		2,536	9,411	
Total	35,693	103,397		24,774	88,971		27,338	109,650		36,804	98,053		19,526	55,265		144,135	455,336	
Distributors of Area and Production and Yield Comparison (% of total)																		
Paddy (wet land)	23.9	22.4	93.7	17.4	19.9	114.4	20.3	24.8	122.2	25.8	21.5	83.4	12.7	11.5	90.5	100.0	100.0	100.0
Paddy (dry land)	24.6	29.5	119.7	12.3	14.4	117.2	14.3	16.6	116.1	27.8	20.7	74.6	20.9	18.7	89.4	100.0	100.0	100.0
Total paddy	24.0	22.8	95.0	16.9	19.6	116.1	19.7	24.3	123.6	26.0	21.5	82.6	13.5	11.9	87.8	100.0	100.0	100.0
Milze	45.7	40.5	88.6	19.8	19.3	97.2	7.2	7.4	102.7	16.9	22.5	133.5	10.4	10.4	99.3	100.0	100.0	100.0
Cassava	15.0	18.0	138.2	22.3	15.3	68.6	18.1	19.1	105.3	27.8	27.8	100.0	18.7	19.8	105.7	100.0	100.0	100.0
Sweet potato	4.1	6.5	160.3	45.8	43.0	98.1	8.4	7.8	92.5	26.0	26.0	100.0	17.7	16.7	94.6	100.0	100.0	100.0
Soybeans	36.4	45.6	125.3	6.7	5.6	83.2	13.5	12.8	94.9	20.6	18.7	90.7	22.8	7.3	75.9	100.0	100.0	100.0
Groundnuts	61.4	62.6	101.9	20.1	20.3	101.1	4.7	4.5	99.2	9.0	8.0	88.8	4.8	4.4	92.5	100.0	100.0	100.0
Mungbeans	14.8	15.2	103.1	22.6	21.5	95.4	20.3	22.0	108.2	19.3	19.3	99.9	23.1	22.0	95.3	100.0	100.0	100.0
Vegetables	12.6	15.1	119.5	22.9	20.5	89.2	12.0	26.7	222.4	29.5	15.0	50.8	23.0	22.8	99.1	100.0	100.0	100.0
Sub-total	24.9	22.8		17.3	19.7		18.8	23.8		25.4	21.5		13.6	12.2		100.0	100.0	
Banana	23.9	25.9	108.2	6.6	13.2	201.7	11.8	18.3	155.3	44.0	33.6	76.3	13.7	9.0	65.8	100.0	100.0	100.0
Rambutan	19.5	15.7	80.6	27.1	12.0	44.2	28.4	65.0	228.9	12.5	3.6	29.1	12.5	3.7	29.8	100.0	100.0	100.0
Citrus	5.2	5.1	96.7	1.7	1.2	70.3	87.2	91.1	104.5	4.9	1.5	31.0	0.9	1.1	123.1	100.0	100.0	100.0
Other fruits	12.1	17.9	147.9	7.6	9.8	127.7	33.2	37.8	113.9	30.9	17.4	56.4	16.2	17.1	105.9	100.0	100.0	100.0
Sub-total	18.2	20.1		9.6	10.7		28.7	38.1		32.1	22.2		12.4	8.9		100.0	100.0	
Total	24.8	22.7		17.2	19.5		19.0	24.1		25.5	21.5		13.5	12.1		100.0	100.0	
Macro items																		
Land cultivated (% of total)	23.6			16.3			20.6	24.6		26.9	28.1		12.6			100.0		100.0
Farm households (% of total)	14.4			19.2			20.6	24.6		28.1	13.5		12.6			100.0		100.0

Note: All figures indicate the five years average from 1982 to 1986.
Source: National Yearbook of Statistics 1987, Directorate Office, South Kalimantan

Table 3.1.1 Planting Areas, Production and Yields of Estate Crops by Kabupaten in the Study Area in 1987

Crop	Tabin			H.S.S			H.S.T			H.S.U			Tabalong			Total Production (ton)			
	Plant. Area (ha)	Production (ton)	Yield (kg/ha)	Plant. Area (ha)	Production (ton)	Yield (kg/ha)	Plant. Area (ha)	Production (ton)	Yield (kg/ha)	Plant. Area (ha)	Production (ton)	Yield (kg/ha)	Plant. Area (ha)	Production (ton)	Yield (kg/ha)				
1. Rubber	12,894	1,891	147	5,754	2,448	425	14,262	6,236	437	24,234	6,581	272	29,435	9,103	309	86,579	26,260	303	
2. Coconut	2,151	1,036	482	9,399	8,567	911	4,908	3,083	628	2,552	1,306	492	3,814	2,210	579	22,924	16,201	707	
3. Hybrid coconut	155	0	0	73	1	12	75	0	0	46	0	0	22	0	0	351	1	3	
4. Pepper	172	19	109	4	1	250	21	2	110	0	0	-	385	149	387	582	171	294	
5. Coffee	151	38	294	85	20	235	342	61	178	1,094	239	218	696	137	196	2,348	495	211	
6. Clove	1,064	37	34	551	35	63	609	43	70	459	16	35	1,008	16	16	3,701	146	39	
7. Others	549	87	159	550	127	230	230	15	65	0	0	-	577	101	175	1,906	330	173	
Total	17,096	3,108		16,416	11,198		20,447	9,440		28,495	8,142		35,937	11,716		118,391	43,604		
Area distribution, Production share and Yield comparison (% of total)																			
1. Rubber	14.9	7.2	48.4	6.6	9.3	140.3	16.5	23.7	144.2	28.0	25.1	89.5	34.0	34.7	102.0	100.0	100.0	100.0	
2. Coconut	9.4	6.4	68.2	41.0	52.9	129.0	21.4	19.0	88.9	11.6	8.1	69.7	16.6	13.6	82.0	100.0	100.0	100.0	
3. Hybrid coconut	38.5	0.0	0.0	20.8	100.0	480.8	21.4	0.0	0.0	13.1	0.0	0.0	6.3	0.0	0.0	100.0	100.0	100.0	
4. Pepper	29.6	11.0	37.1	0.7	0.6	85.1	3.6	1.4	37.4	0.0	0.0	-	66.2	87.1	131.7	100.0	100.0	100.0	
5. Coffee	5.6	7.8	139.3	3.6	4.0	111.4	14.6	12.3	84.5	46.6	48.3	103.7	29.6	27.6	93.1	100.0	100.0	100.0	
6. Clove	28.7	25.1	87.3	14.9	23.6	158.8	16.5	29.1	177.0	12.7	11.2	88.2	27.2	11.0	40.3	100.0	100.0	100.0	
7. Others	28.8	26.5	91.9	28.9	38.3	132.8	12.1	4.6	37.8	0.0	0.0	-	30.3	30.7	101.3	100.0	100.0	100.0	
Total	14.4	7.1	-	13.9	25.7	-	17.3	21.6	-	24.1	18.7	-	30.4	26.9	-	100.0	100.0	100.0	
<u>Macro item</u>																			
Smallholders estates		14.4			19.1			25.1			21.7			19.6				100.0	

Source: Dinas Estate Crops, South Kalimantan

Table 3.12 Cropping Area of Estate Crop by Type of Management in the Study Area in 1987

Crop	Smallholder PMU		Smallholder Non-PMU ^{a/}		NIES		Private Estate		Total	
	(ha)	(%)	(ha)	(%)	(ha)	(%)	(ha)	(%)	(ha)	(%)
Rubber	3,296	(3.8)	68,302	(78.9)	11,674	(13.5)	3,307	(3.8)	86,579	(100.0)
Coconut	436	(1.9)	22,488	(98.1)	0	-	0	-	22,924	(100.0)
Pepper	129	(22.2)	453	(77.8)	0	-	0	-	582	(100.0)
Coffee	0	-	2,348	(100.0)	0	-	0	-	2,348	(100.0)
Clove	0	-	3,701	(100.0)	0	-	0	-	3,701	(100.0)
Capok	0	-	516	(100.0)	0	-	0	-	516	(100.0)
Cashewnut	0	-	248	(100.0)	0	-	0	-	248	(100.0)
Cassia vera	0	-	282	(100.0)	0	-	0	-	282	(100.0)
Sugarcane	0	-	1	(100.0)	0	-	0	-	1	(100.0)
Betel palm	0	-	190	(100.0)	0	-	0	-	190	(100.0)
Nutmeg	0	-	2	(100.0)	0	-	0	-	2	(100.0)
Cacao	0	-	8	(4.5)	0	-	171	(95.5)	179	(100.0)
Jute	0	-	145	(100.0)	0	-	0	-	145	(100.0)
Kenaf	0	-	45	(100.0)	0	-	0	-	45	(100.0)
Hybrid coconut	0	-	351	(100.0)	0	-	0	-	351	(100.0)
Candle nut tree	0	-	298	(100.0)	0	-	0	-	298	(100.0)
Sugar palm	0	-	397	(100.0)	0	-	0	-	397	(100.0)
Total	3,861	(3.3)	99,775	(84.0)	11,674	(9.8)	3,478	(2.9)	118,788	(100.0)

Note: PMU; Project Management Unit
 NIES; Nucleus Estate and Smallholder
^{a/} Smallholders in NIES schemes are not included.

Source: Provincial Department of Directorate General (DINAS) Estate Crops, South Kalimantan
 Table 3.13

Table 3.13 Cropping Area of Estate Crop by Type of Management and Kabupaten in the Study Area in 1987

Crop	Tabalong			P.S.Ukara			E.S.Terasah			H.S.Sejayan			Tajin			Total											
	Small Holder	NES	Private	Small Holder	NES	Private	Small Holder	NES	Private	Small Holder	NES	Private	Small Holder	NES	Private	Small Holder	NES	Private									
	PMU	Non-PMU*	Estate	PMU	Non-PMU*	Estate	PMU	Non-PMU*	Estate	PMU	Non-PMU*	Estate	PMU	Non-PMU*	Estate	PMU	Non-PMU*	Estate									
1. Rubber	502	23,196	2,710	3,027	1,538	18,890	3,586	220	602	13,650	0	0	192	5,562	0	0	462	6,994	5,378	60	3,296	68,302	11,674	3,307	86,579		
2. Coconut	0	3,814	0	0	0	2,652	0	0	0	4,908	0	0	175	9,224	0	0	261	1,890	0	0	0	436	22,488	0	0	22,924	
3. Pepper	0	385	0	0	0	0	0	0	0	21	0	4	0	0	0	0	129	43	0	0	0	129	453	0	0	582	
4. Coffee	0	696	0	0	0	1,094	0	0	0	342	0	0	0	85	0	0	0	131	0	0	0	0	2,548	0	0	2,348	
5. Clove	0	1,008	0	0	0	469	0	0	0	609	0	0	0	551	0	0	0	1,064	0	0	0	0	3,701	0	0	3,701	
6. Capok	0	173	0	0	0	0	0	0	0	55	0	16	0	0	0	0	0	272	0	0	0	0	516	0	0	516	
7. Cashewnut	0	187	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	61	0	0	0	0	248	0	0	248	
8. Cassia vera	0	0	0	0	0	0	0	0	0	0	0	0	0	249	0	0	0	33	0	0	0	0	282	0	0	282	
9. Sugarcane	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	1	
10. Betel palm	0	172	0	0	0	0	0	0	0	0	0	18	0	0	0	0	0	0	0	0	0	0	190	0	0	190	
11. Nutmeg	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2	0	0	2	
12. Rosell hemp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
13. Cocoa	0	0	0	0	0	0	0	0	0	4	0	0	0	0	171	0	0	0	4	0	0	0	0	8	0	0	179
14. Jute	0	0	0	0	0	0	0	0	0	0	0	0	0	145	0	0	0	0	0	0	0	0	145	0	0	145	
15. Kenaf	0	45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	45	0	0	45	
16. Hybrid coconut	0	22	0	0	0	46	0	0	0	75	0	0	0	73	0	0	0	135	0	0	0	0	351	0	0	351	
17. Candlenut tree	0	0	0	0	0	0	0	0	0	0	0	120	0	0	0	0	0	178	0	0	0	0	298	0	0	298	
18. Sugar palm	0	0	0	0	0	0	0	0	0	251	0	0	0	146	0	0	0	0	0	0	0	0	397	0	0	397	
Total	502	29,698	2,710	3,027	1,538	23,151	3,586	220	602	19,925	0	171	367	16,195	0	0	852	10,806	5,378	60	3,861	99,775	11,674	3,478	118,788		

Note: PMU: Project Management Unit
 NES: Nucleus Estate and Smallholder
 *: Smallholders in NES schemes are not included.

Source: Provincial Department of Directorate (DINAS) Estate Crops, South Kalimantan.

Table 3.14 Development Progress of NES Schemes in South Kalimantan as of December 1987

Kabupaten/ Name of Project	Nucleus		Small Holder		Food Crop Area		Home Yard		House		Local b/		Transmigrant		Road		Checkdam	
	Target (ha)	Realized (ha)	Target (ha)	Realized (ha)	Target (ha)	Realized (ha)	Target (ha)	Realized (ha)	Target (No.)	Realized (No.)	Target (family)	Realized (family)	Target (km)	Realized (km)	Target (No.)	Realized (No.)	Target (No.)	Realized (No.)
Tasbalong																		
NES II Muara Uya	2,000	0	4,500	3,312	0	625	488	1,250	2,500	1,750	139	2,400	611	28	13	0	0	0
Banjar & Tapin																		
NES III Darau Salak a/	4,000	4,000	12,000	11,742	3,200	2,418	800	602	4,000	3,009	4,000	2,918	392	140	24	23		
H.S. Uluara																		
NES II Paringin	0	0	5,500	4,060	750	0	563	89	1,750	322	225	94	1,525	224	20	0	5	5
Sub-total (% of target)	6,000 (100)	4,000 (67)	22,000 (100)	19,054 (87)	4,325 (100)	2,418 (56)	1,988 (100)	1,129 (57)	7,000 (100)	5,831 (83)	5,975 (100)	3,151 (53)	4,317 (100)	975 (23)	440 (100)	153 (35)	29 (100)	26 (90)
Kota baru																		
NES I Batu Licin	1,500	1,700	6,000	3,261	1,500	1,450	616	500	2,463	1,275	300	0	2,700	1,480	120	98	10	7
NES II Parnaikan	0	0	5,000	2,000	1,500	0	625	37	2,500	147	250	0	2,250	147	68	13	13	2
Tanah Lusu																		
NES I Sagar Pelemban	5,000	5,119	n.a.	3,810	2,194	864	732	288	1,500	1,227	755	1,270	2,170	1,186	117	25	7	0
Total	12,500 (100)	10,819 (87)	33,000 (100)	28,125 (85)	9,519 (100)	4,732 (50)	3,961 (100)	1,954 (49)	13,465 (100)	8,480 (63)	7,280 (100)	4,421 (61)	11,437 (100)	3,788 (33)	745 (100)	289 (39)	59 (100)	35 (59)

Note: a/ NES III Project was Funded by IBRD

b/ Local transmigrant

Source: Provincial Department of Directorate General (DEVAS) Estate Crops, South Kalimantan

Table 3.15 Rubber Planting Area and Production in the Study Area by Estate in 1987

	Planting Area				Production Yield				
	Productive	Young	Old	Total	Productive	(tons)	(% of sub-total)	Productive (kg/ha)	Planting (kg/ha)
	(ha)	(ha)	(ha)	(ha)	Area (%)				
(1)	(2)	(3)	(4=1+2+3)	(5=1/4)	(6)	(7)	(8=6/1)	(9=6/4)	
Tapin									
1. Smallholders	3,455	8,828	551	12,834	(26.9)	1,869	(98.9)	541	146
- NES	0	5,378	0	5,378	0.0	0	-	-	-
- Individual	3,455	2,988	551	6,994	(49.4)	1,869	(98.9)	541	267
2. Private estates	20	0	40	60	(33.3)	21	(1.1)	1,062	354
Sub-total	3,475	8,828	591	12,894	(27.0)	1,891	(100.0)	544	147
H.S.Selatan									
1. Smallholders	4,663	827	264	5,754	(81.0)	2,448	(100.0)	525	425
- NES	0	0	0	0	-	0	-	-	-
- PMU	0	192	0	192	0.0	0	-	-	-
- Individual	4,663	635	264	5,562	(83.8)	2,448	(100.0)	525	440
2. Private estates	0	0	0	0	-	0	-	-	-
Sub-total	4,663	827	264	5,754	(81.0)	2,448	(100.0)	525	425
H.S.Tengah									
1. Smallholders	10,842	1,533	1,887	14,262	(76.0)	6,236	(100.0)	575	437
- NES	0	0	0	0	-	0	-	-	-
- PMU	0	602	0	602	-	0	-	-	-
- Individual	10,842	931	1,887	13,660	(79.4)	6,236	(100.0)	575	457
2. Private estates	0	0	0	0	-	0	-	-	-
Sub-total	10,842	1,533	1,887	14,262	(76.0)	6,236	(100.0)	575	437
H.S.Utara									
1. Smallholders	12,164	10,339	1,511	24,014	(50.7)	6,530	(99.2)	537	272
- NES	0	3,586	0	3,586	-	0	-	-	-
- PMU	0	1,538	0	1,538	-	0	-	-	-
- Individual	12,164	5,215	1,511	18,890	(64.4)	6,530	(99.2)	537	346
2. Private estates	90	0	130	220	(40.9)	51	(0.8)	571	234
Sub-total	12,254	10,339	1,641	24,234	(50.6)	6,581	(100.0)	537	272
Tabalong									
1. Smallholders	15,214	6,489	4,705	26,408	(57.6)	8,700	(95.6)	572	329
- NES	0	2,710	0	2,710	-	0	-	-	-
- PMU	0	502	0	502	-	0	-	-	-
- Individual	15,214	3,277	4,705	23,196	(65.6)	8,700	(95.6)	572	375
2. Private estates	1,075	1,614	338	3,027	(35.5)	403	(4.4)	375	133
Sub-total	16,289	8,103	5,043	29,435	(55.3)	9,103	(100.0)	559	309
Total									
1. Smallholders	46,338	28,016	8,918	83,272	(55.6)	25,784	(98.2)	556	310
- NES	0	11,674	0	11,674	-	0	-	-	-
- PMU	0	3,296	0	3,296	-	0	-	-	-
- Individual	46,338	13,046	8,918	68,302	(67.8)	25,784	(98.2)	556	377
2. Private estates	1,185	1,614	508	3,307	(35.8)	476	(1.8)	401	144
Total	47,523	29,630	9,426	86,579	(54.9)	26,260	(100.0)	553	303
Distribution of area									
(% of total planting area)									
1. Smallholders	55.6	33.6	10.7	100.0	-	-	-	-	-
- NES	0.0	100.0	0.0	100.0	-	-	-	-	-
- PMU	0.0	100.0	0.0	100.0	-	-	-	-	-
- Individual	67.8	19.1	13.1	100.0	-	-	-	-	-
2. Private estates	35.8	48.8	15.4	100.0	-	-	-	-	-
Total	54.9	34.2	10.9	100.0	-	-	-	-	-

Source: Development Progress of Estate Crops 1988, Provincial Department of Directorate General (DINAS) Estate Crops, South Kalimantan

Table 3.16 Existing Private Estates in South Kalimantan Province in 1988

Kabupaten	Name of Private Estate	Location	Crop Planted	Area (ha)	
				Target	Realized
Tapin	1. P.T.Aintha	Banyu Hambar	Rubber	1,270	60
H.S.Tengah	1. P.T.Sapto Argo Unggul	Batang Alai Selatan	Cocoa	1,074	155
H.S.Utara	1. P.T.H.Masykur	Lampihong	Rubber	52	50
	2. Cooperatie Catur Sakti Kores 1305	Paringin	Rubber	70	70
	3. C.V.H.M.Sidiq	Juai	Rubber	127	100
	4. P.T.Keruwing Indah*	Awayan	Ginger	100	1
Tabalong	1. P.T.Sewarga Rubber	Hayup Tabalong	Rubber	4,146	2,925
	2. P.T.Batani		Rubber	400	91
	3. C.V.Semar	Tanta	Rubber	240	144
	4. C.V.Sinar Baru	Banua Ramba	Rubber	236	134
Sub-total	10 - Private Estates			7,715	3,730
Banjar	1. P.T.Batu Agung Mulia	Sei Tabuk	Rubber	53	30
	2. Bangkal Lokan	Bangkal	Rubber	290	146
	3. Fa.Anwar Intan	Karang Intan	Rubber	346	330
	4. P.T.Panguran Baru	Astambul	Rubber	338	238
	5. H.Mubarak H.Ali Seffi	Banjar	Rubber	157	109
	6. P.T.Sebo Agung*	Banjar	Ginger	500	0
	7. P.T.Insan Bonafide*	Banjar	Rubber	n.a	0
Tanah Laut	1. P.T.Aneka Lima Upang	Bati-Bati	Rubber	216	45
	2. P.T.Candi Artha	Jorong	Cloves and Coffee	1,078	152
	3. P.T.Maskota Bumi	Bati-Bati	Rubber	6,100	840
	4. P.T.Meratus Chyoda	Tajau Pecah	Rubber	510	275
	5. C.V.Janbar	Angsau	Rubber	78	49
	6. C.V.Budi Baik	Pelaihari	Cloves and Coconut	41	20
	7. H.Basuni	Pelaihari	Cloves and Coconut	500	5
	8. Ati-Ati	Desa ketapang	Rubber, Coconut	545	26
	9. P.T.Pugung Raya	Tanah laut	Coconut, Cocoa, etc.	300	0
	10. P.T.Tirta Geni Agung	Tanah laut	Cloves and Cocoa	250	0
	11. Corea Development Co.LTD	Tanah laut	Palm	30,000	0
	12. M.Narita Raya Sentosa	Tanah laut	Cocoa	1,500	0
Kota Baru	1. P.T.Bersama Sejahtera Sakti	Kota Baru	Palm	14,000	1,495
	2. P.T.Sinar Kencana Inti Perkasa	Kota Baru	Palm	14,000	440
	3. P.T.Buana Inti Naga*	Kota Baru	Multi Crop	15,000	0
	4. P.T.Indah Sejati Persada*	Kota Baru	Multi Crop	15,000	0
	5. P.T.Makmur Jagat Abad*	Kota Baru	Multi Crop	17,000	0
	6. P.T.Cipta Subur Nusa Jaya*	Kota Baru	Multi Crop	16,000	0
	7. P.T.Pertiwi Sakti Perkasa*	Kota Baru	Multi Crop	15,000	0
	8. P.T.Bumi Pondok Air*	Kota Baru	Palm	7,000	0
Total	37 Private Estates			163,517	7,930

*: Newly established private estate in 1987/88

Source: Provincial Department of Directorate General (DINAS) Estate Crops, South Kalimantan

Table 3.17 Comparison of Livestock Population per 100 Farm Households among the Study Area by Kabupaten, South Kalimantan and Indonesia

	Tapin	H.S.S	H.S.T	H.S.U	Tabalong	Study Area	South Kalimantan	Indonesia
<u>Livestock Population (4 years average of 1983-86 in '000)</u>								
Cattle	9.1	2.6	4.2	2.7	5.5	24.1	71	9,236
Buffalo	0.9	2.9	4.1	10.0	0.0	17.9	50	3,018
Pig	0.1	0.2	1.3	1.3	5.6	8.4	9	5,286
Goat	4.4	3.6	14.0	6.3	7.9	36.2	58	9,933
Sheep	0.4	1.6	3.0	3.8	0.5	9.2	11	4,854
Chicken	368.2	458.5	739.4	554.1	342.0	2462.3	2,462	140,104
Improved	10.9	13.5	39.2	42.1	15.8	121.5	555	33,383
- Traditional	357.3	445.0	700.3	512.0	326.2	2340.8	4,140	106,721
Duck	63.3	412.0	410.5	689.8	60.1	1635.7	2,095	16,487
<u>Livestock Population per 100 Farms (heads/100 farm households)</u>								
Cattle	39.7	8.5	10.7	6.0	25.5	15.2	21.2	45.4
Buffalo	3.9	9.5	10.5	22.4	0.0	11.3	15.0	14.8
Pig	0.4	0.7	3.3	2.9	26.0	5.3	2.7	26.0
Goat	19.2	11.8	35.8	14.1	36.6	22.8	17.3	48.8
Sheep	1.7	5.2	7.7	8.5	2.3	5.8	3.3	23.9
Chicken	1,607.9	1,502.3	1,892.0	1,241.5	1,585.5	1,551.5	736.3	688.7
Improved	47.6	44.2	100.3	94.3	73.2	76.6	166.0	164.1
- Traditional	1,560.3	1,458.1	1,792.0	1,147.2	1,512.3	1,475.0	1,238.0	524.6
Duck	276.4	1,349.9	1,050.4	1,545.6	278.6	1,030.7	626.5	81.0
<u>Comparison of Livestock Population per 100 Farms (Indonesia = 100)</u>								
Cattle	88	19	24	13	56	33	47	100
Buffalo	26	64	71	151	0	76	101	100
Pig	2	3	13	11	100	20	10	100
Goat	39	24	73	29	75	47	36	100
Sheep	7	22	32	36	10	24	14	100
Chicken	233	218	275	180	230	225	107	100
- Impecows	29	27	61	57	45	47	101	100
- Traditional	297	278	342	219	288	281	236	100
Duck	341	1666	1296	1907	344	1272	773	100
<u>Memo items</u>								
Farm households (1985 in '000)	22.9	30.5	39.1	44.6	21.6	158.7	334	20,345

Note: All the figures of livestock population indicate the four years average from 1983 to 1986.

Source: Statistical Yearbook of South Kalimantan 1983...1987, Statistics Office, South Kalimantan
Statistics on Livestock 1988, Directorate General for Livestock, Ministry of Agriculture

Table 3.18 Livestock Production by Kabupaten in the Study Area

	Tabin			H.S.S.			H.S.U.			Tabelang			Tera		
	Pro- duction (ton)	Share of Products (%)	Share of Products (%)	Pro- duction (ton)	Share of Products (%)	Share of Products (%)	Pro- duction (ton)	Share of Products (%)	Share of Products (%)	Pro- duction (ton)	Share of Products (%)	Share of Products (%)	Pro- duction (ton)	Share of Products (%)	Share of Products (%)
Meat															
Cattle	280	(38.7)	(10.0)	78	(10.0)	(10.9)	82	(7.6)	(26.1)	170	(7.6)	(26.1)	738	(16.7)	(16.7)
Buffalo	9	(1.2)	(4.0)	3	(4.0)	(3.7)	105	(9.7)	(0.2)	1	(0.2)	(0.2)	189	(4.3)	(4.3)
Pig	1	(0.1)	(0.4)	3	(0.4)	(1.4)	17	(1.6)	(11.0)	72	(1.6)	(11.0)	110	(2.5)	(2.5)
Goat	10	(1.4)	(1.0)	8	(1.0)	(2.6)	15	(1.4)	(2.6)	17	(1.4)	(2.6)	80	(1.8)	(1.8)
Sheep	0	0.0	(0.3)	2	(0.3)	(0.2)	2	(0.4)	(0.1)	0	(0.1)	(0.1)	10	(0.2)	(0.2)
Chicken	398	(54.9)	(63.1)	493	(63.1)	(67.3)	791	(53.8)	(56.4)	368	(53.8)	(56.4)	2,634	(59.6)	(59.6)
- Improved	9	(1.2)	(1.0)	8	(1.0)	(2.1)	25	(2.4)	(2.0)	13	(2.4)	(2.0)	81	(1.8)	(1.8)
- Traditional	389	(53.7)	(62.1)	485	(62.1)	(65.2)	766	(51.4)	(54.4)	355	(51.4)	(54.4)	2,553	(57.8)	(57.8)
Duck	26	(3.6)	(21.3)	166	(21.3)	(14.0)	278	(25.6)	(3.7)	24	(25.6)	(3.7)	658	(14.9)	(14.9)
Total Meat	724	(100.0)	(100.0)	781	(100.0)	(100.0)	1,175	(100.0)	(100.0)	652	(100.0)	(100.0)	4,419	(100.0)	(100.0)
Eggs															
Chicken	276	(53.7)	(20.1)	305	(20.1)	(30.1)	688	(19.7)	(60.2)	344	(19.7)	(60.2)	2,244	(27.7)	(27.7)
- Improved	128	(24.9)	(7.9)	120	(7.9)	(17.1)	392	(13.1)	(36.6)	209	(13.1)	(36.6)	1,268	(15.7)	(15.7)
- Traditional	148	(28.8)	(12.2)	185	(12.2)	(12.9)	296	(6.6)	(23.6)	135	(6.6)	(23.6)	976	(12.1)	(12.1)
Duck	238	(46.3)	(79.9)	1,214	(79.9)	(69.9)	1,598	(80.3)	(39.8)	227	(80.3)	(39.8)	5,846	(72.3)	(72.3)
Total Eggs	514	(100.0)	(100.0)	1,519	(100.0)	(100.0)	2,286	(100.0)	(100.0)	571	(100.0)	(100.0)	8,090	(100.0)	(100.0)
Production Share by Kab. (% of total study area)															
Meat															
Cattle	38			11			17			23			100		
Buffalo	5			15			56			1			100		
Pig	1			3			15			65			100		
Goat	13			10			38			21			100		
Sheep	3			21			47			5			100		
Chicken	15			19			22			14			100		
- Improved	11			10			31			16			100		
- Traditional	15			19			22			14			100		
Duck	4			25			42			4			100		
Total Meat	16			18			27			15			100		
Eggs															
Chicken	12			14			31			15			100		
- Improved	10			9			31			16			100		
- Traditional	15			19			30			14			100		
Duck	4			21			27			2			100		
Total Eggs	6			19			28			7			100		

Note: All the figures of livestock production indicate the four years average from 1983 to 1986.
Source: Statistical Yearbook of South Kalimantan 1983-1987, Statistics Office, South Kalimantan.
Statistics on Livestock 1988, Directorate General for Livestock, Ministry of Agriculture

Table 3.19 Livestock Population and Growth Rates in the Study Area by Kabupaten, 1982-1986

	1982 (^{'000})	1983 (^{'000})	1984 (^{'000})	1985 (^{'000})	1986 (^{'000})	4 Years Ave.(1983-86)		Growth Rate 1982-86 (% p.a.)
						(^{'000})	(% of total)	
TOTAL STUDY AREA								
Cattle	21.9	21.8	23.3	24.5	26.7	24.1	100.0	5.1
Buffalo	16.3	18.6	18.7	16.7	17.8	17.9	100.0	2.3
Pig	9.5	8.9	8.7	9.1	6.8	8.4	100.0	-8.5
Horse	0.9	0.9	0.9	1.0	1.0	0.9	100.0	3.4
Goat	33.6	30.9	33.2	34.9	45.7	36.2	100.0	8.0
Sheep	24.7	13.3	13.6	5.4	4.6	9.2	100.0	-52.3
Chicken	2,191.8	2,165.5	2,237.6	2,658.8	2,787.2	2,462.3	100.0	6.2
- Improved	103.5	107.2	121.6	122.3	134.9	121.5	100.0	6.9
- Traditional	2,088.4	2,058.3	2,116.0	2,536.5	2,652.3	2,340.8	100.0	6.2
Duck	1,526.4	1,514.8	1,548.3	1,654.4	1,825.5	1,635.7	100.0	4.6
TAPIN								
Cattle	7.0	8.3	9.0	9.1	10.1	9.1	37.9	9.8
Buffalo	1.5	1.2	1.0	0.5	0.8	0.9	4.9	-15.9
Pig	0.1	0.1	0.0	0.0	0.0	0.1	0.6	-23.7
Horse	0.7	0.7	0.7	0.8	0.8	0.7	77.7	5.0
Goat	3.7	3.8	4.4	4.5	5.0	4.4	12.2	7.9
Sheep	0.8	0.6	0.5	0.2	0.2	0.4	3.9	-42.7
Chicken	348.5	354.1	360.7	369.1	389.0	368.2	15.0	2.8
- Improved	1.5	4.3	8.9	14.0	16.4	10.9	9.0	81.5
- Traditional	347.0	349.9	351.8	355.1	372.6	357.3	15.3	1.8
Duck	56.7	58.8	61.2	63.4	69.8	63.3	3.9	5.4
H.S.SELATAN								
Cattle	2.5	2.4	2.5	2.6	2.7	2.6	10.6	2.4
Buffalo	3.8	3.8	3.8	1.9	2.1	2.9	16.3	-15.2
Pig	0.1	0.1	0.2	0.2	0.2	0.2	2.3	14.1
Horse	0.0	0.0	0.0	0.0	0.0	0.0	0.7	8.8
Goat	2.0	2.6	3.1	3.6	5.0	3.6	9.9	25.5
Sheep	3.6	3.6	2.7	0.0	0.0	1.6	16.9	
Chicken	422.9	423.7	470.4	472.5	467.4	458.5	18.6	2.5
- Improved	17.2	18.0	12.8	14.0	9.1	13.5	11.1	-17.3
- Traditional	405.7	405.7	457.6	458.5	458.3	445.0	19.0	3.1
Duck	397.0	406.6	420.7	453.9	366.9	412.0	25.2	-2.0
H.S.TENGGAH								
Cattle	3.0	3.2	3.6	4.7	5.3	4.2	17.4	14.9
Buffalo	3.1	3.6	3.8	4.3	4.7	4.1	22.8	11.2
Pig	0.7	0.8	0.9	1.7	1.8	1.3	15.3	25.0
Horse	0.1	0.1	0.1	0.1	0.1	0.1	6.7	9.8
Goat	11.2	9.7	10.4	12.9	22.9	14.0	38.7	19.7
Sheep	16.1	5.2	5.4	0.0	1.3	3.0	32.4	-87.4
Chicken	544.3	518.4	521.5	925.6	992.3	739.4	30.0	16.2
- Improved	36.6	39.5	41.3	37.2	38.7	39.2	32.2	1.4
- Traditional	507.6	478.9	480.2	888.4	953.6	700.3	29.9	17.1
Duck	320.6	310.0	315.3	391.6	625.2	410.5	25.1	18.2
H.S.UTARA								
Cattle	2.6	2.7	2.8	2.5	2.7	2.7	11.1	0.9
Buffalo	7.9	10.0	10.0	9.9	10.2	10.0	55.8	6.4
Pig	0.5	0.8	0.9	1.7	1.8	1.3	15.3	35.0
Horse	0.1	0.1	0.1	0.1	0.1	0.1	13.9	-7.6
Goat	7.5	6.7	6.9	7.2	4.1	6.3	17.3	16.0
Sheep	3.5	3.4	4.4	4.6	3.0	3.8	41.5	-3.9
Chicken	538.5	548.2	551.8	555.7	560.7	554.1	22.5	1.0
- Improved	37.2	41.8	43.7	42.6	40.5	42.1	31.7	2.2
- Traditional	501.4	506.4	508.1	513.1	520.2	512.0	21.9	0.9
Duck	675.2	682.0	692.5	690.4	694.3	689.8	42.2	0.7
TABALONG								
Cattle	6.9	5.2	5.5	5.5	5.9	5.5	23.0	-3.7
Buffalo	0.0	0.0	0.1	0.0	0.0	0.0	0.2	-23.0
Pig	8.0	7.0	6.7	5.5	3.0	5.6	66.5	-27.8
Horse	0.0	0.0	0.0	0.0	0.0	0.0	0.9	-25.7
Goat	9.2	8.1	8.3	6.7	8.6	7.9	21.9	-1.9
Sheep	0.7	0.6	0.6	0.7	0.1	0.5	5.3	-76.9
Chicken	337.7	321.1	333.2	335.9	377.9	342.0	13.9	2.9
- Improved	11.0	3.6	14.9	14.5	30.3	15.8	13.0	28.8
- Traditional	326.7	317.5	318.3	321.4	347.6	326.2	13.9	1.6
Duck	77.0	57.5	58.6	55.1	69.3	60.1	3.7	-2.7

Source: Statistical Yearbook of South Kalimantan 1983...1987, Statistics Office, South Kalimantan

Table 3.20 Food Balance Estimate in the Study Area

Product	Average c/ Annual Production 1982-86 (t/year)	f/ Per Capita Consumption (kg/year)	a/ Food Consumption (t/year)	Other Use and Waste		Total Consumption (t/year) (6=3+5)	Balance (t/year) (7=1-6)
				g/ Rate (%)	h/ Total (t/year)		
	(1)	(2)	(3)	(4)	(5)		
Rice c/	283,900	145.21	129,266	3	3,878	133,144	150,756
Maize	1,990	26.60	23,679	21	4,973	28,652	-26,662
Cassava	12,410	57.41	51,106	26	13,288	64,394	-51,984
Sweet potato	5,280	12.46	11,092	10	1,109	12,201	-6,921
Soybeans	570	4.45	3,961	10	396	4,358	-3,788
Groundnuts	3,310	3.00	2,671	10	267	2,938	372
Coconuts	14,510	5.00	4,451	122	5,430	9,881	4,628
Vegetables	4,690	14.62	13,015	16	2,082	15,097	-10,407
Fruits	9,411	22.26	19,816	12	2,378	22,194	-12,783
Meat	4,419	3.65	3,249	10	325	3,574	845
Eggs	8,090	1.49	1,326	25	332	1,658	6,432
Milk	0	3.32	2,955	3	89	3,044	-3,044
Fishes d/	39,780	10.83	9,641	18	1,735	11,376	28,404

Note: a/; Food consumption = Per capita consumption x Population in the Study Area in 1985 (890,200) + Other use and waste
b/; Figures in parentheses indicate minus balances.
c/; Average annual production of rice is estimated by applying the milling rate of 0.68.
d/; Per capita consumption of fish includes seawater fish.

Source: e/; Statistical Yearbook of South Kalimantan, 1983 ...1987, Statistics Office, South Kalimantan
f/; Food balance Sheet in Indonesia 1983, CBS

Table 3.21 BULOG Rice Program in Indonesia, 1978/79 - 1987/88

	1978/79	1979/80	1980/81	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88
Beginning stock	498	749	918	1,274	1,623	1,045	1,455	2,387	2,122	1,775
Domestic procurement	881	431	1,635	1,952	1,933	1,195	2,374	1,943	1,586	1,250
Import:	1,268	2,580	1	437	506	1	187	0	41	136
PL-480 /f	304	353	101	46	0	65	54	0	0	0
Other food	15	327	198	48		140			41	136
Commercial	949	1,900	914	343	506	910	133	0		
Total Availability	2,647	3,760	3,766	3,663	4,062	3,355	4,016	4,350	3,749	3,161
Distribution /a	1,852	2,834	2,480	2,014	2,972	1,872	1,612	2,186	1,954	2,333
Government	608	666	649	806	1,320	1,373	1,368	1,414	1,498	1,511
State enterprises	106	90	89	95	105	89	59	77	94	102
Market operations	1,032	2,036	1,628	1,033	1,518	399	69	277	175	600
Other /d	106	42	114	80	29	11	116	418	187	120
Losses	46	8	12	26	45	28	17	22	20	35
End stock	749	918	1,274	1,623	1,045	1,455	2,387	2,122	1,775	793
Memorandum item										
Rice production /b	17,325	17,872	20,163	22,286	22,837	24,006	25,933	26,542	27,014	27,202

/a: Since June 1982, all regions have received rice in kind; formerly, surplus regions received food allowances in money.

/b: On calendar year basis

/c: Preliminary estimate.

/d: Includes export of 95,000 tons in 1984/85 and 480,000 tons in 1985/86, and 201,000 tons in 1986/87.

/e: In 1986/87, the figure shows repayment of rice loans.

/f: U.S. Public law 480

Source: BULOG (Badan Urusan Logistik; State Logistic Board)

Table 3.22 DOLOG Rice Program in South Kalimantan Province, 1983/84 -1987/88

	1983/84 (ton)	1984/85 (ton)	1985/86 (ton)	1986/87 (ton)	1987/88 (ton)	5 Years Average	
						(ton)	Share (%) a/
Beginning Stock	17,113	29,974	40,733	59,410	68,281	43,102	-
Procurement in the Region							
DOLOG itself	785	3,411	5,961	2,926	691	2,755	4.3
Through Sub-DOLOG	6,527	6,087	4,890	4,191	9,981	6,335	10.0
Through rice mill	8,158	763	6,431	5,154	0	4,101	6.4
Sub-total	15,470	10,261	17,282	12,271	10,672	13,191	20.7
Other Procurement							
Internal move in	38,009	24,818	31,084	32,022	40,498	33,286	52.3
Import	9,184	6,729	0	0	0	3,183	5.0
Others	120	190	1,536	1,650	247	749	1.2
Sub-total	47,313	31,737	32,620	33,672	40,745	37,217	58.5
Total procurement	78,253	52,259	67,184	58,214	62,089	63,600	100.0
Total Availability	95,366	82,233	107,917	117,624	130,370	106,702	-
Distribution							
Government	25,619	24,655	26,472	27,117	29,036	26,580	50.9
State enterprises	60	0	152	566	536	263	0.5
Move national	10,950	9,908	8,020	10,250	11,129	10,051	19.3
Move Regional	6,550	6,244	4,900	4,000	10,000	6,339	12.1
Market Operation	13,884	165	674	0	4,951	3,935	7.5
Others	8,329	528	8,289	7,410	473	5,006	9.6
Total distribution	65,392	41,500	48,507	49,343	56,125	52,173	100.0
End Stock	29,974	40,733	59,410	68,281	74,245	54,529	-
Memorandum item							
Rice Production b/	513,138	577,965	610,804	617,666	n.a	579,893	-

a/: Percentages are calculated as total procurement = 100% for the procurement, and total distribution = 100% for the distribution.

b/: Production in calendar year

Source: DOLOG, South Kalimantan

Table 3.23 DOLOG Godown Capacity by Kabupaten in South Kalimantan

Kabupaten/ Location	Godown (No.)	Capacity (tons)	Share of Capacity	
			Study Area (%)	Province (%)
Tapin				
- Tapin Utara	2	2,000	21.1	5.5
H.S. Tengah				
- Pandawan	1	3,500	36.8	9.6
- Labuan Amas Selatan	1	1,000	10.5	2.7
- Haruyan	1	2,000	21.1	5.5
Sub-total	5	9,500	100.0	26.0
Kotabaru				
- Pulau Laut Utara	1	1,000	-	2.7
Banjar				
- Laudasau Ulin	2	7,000	-	19.2
Banjarmasin				
- Banjar Barat	7	19,000	-	52.1
Total in South Kalimantan	15	36,500	-	100.0

Source: DOLOG, South Kalimantan

Table 3.24 Number of Rice Mill Unit (RMU) by Kabupaten in the Study Area in 1987

Kabupaten	Number of RMU		Total b/ Number (No.)	Total b/ Milling Capacity (tons/hr)	Estimated a/ Annual Capacity (tons/year)
	KUD c/ (No.)	Others (No.)			
Tapin	8	82	90	48.2	97,846
H.S.Selatan	10	83	93	20.8	42,224
H.S.Tengah	11	123	134	38.6	78,358
H.S.Utara	3	132	135	31.0	62,930
Tabalong	7	67	74	29.6	60,088
Total	39	487	526	168.2	341,446
South Kalimantan	57	1,190	1,247	422.6	857,878

a/: Annual milling capacities are estimated based on the following calculation:

Total milling capacity (tons/hr) x Daily working hour (7 hours/day)
x Annual working days (290 days/year)

Source: b/; Report on the Paddy Processing Inventory in South Kalimantan 1987, DINAS Food Crops
c/; KANWIL Cooperatives, South Kalimantan

Table 3.25 Existing Processing Facilities for Estate Crops in South Kalimantan Province in 1989

Crop/ Kabupaten	Name	Location	Product	Processing Capacity
Rubber				
Tapin	* 1. 47 small scale facilities	Rantau, etc.	RSS	705 tons/year
H.S.Selatan	* 2. 57 small scale facilities	Kandangan, etc.	RSS	855 tons/year
H.S.Tengah	* 3. P.T.Dharma Kalimantan Jaya	Barabai	Crumb rubber	3,600 tons/year
	* 4. P.T.Hevea Kalimantan	Barabai	Crumb rubber	3,600 tons/year
	* 5. 748 small scale facilities	Barabai, etc.	RSS	11,220 tons/year
H.S.Utara	* 6. P.T.Karias Tabing Kencana	Amuntai	Crumb rubber	3,600 tons/year
	* 7. 486 small scale facilities	Amuntai, etc.	RSS	7,290 tons/year
Tabalong	* 8. P.T.Swarga Rubber	Hayup/Tabalong	RSS	n.a
	* 9. 402 small scale facilities	Tanjung, etc.	RSS	6,030 tons/year
Banjar	10. PTP.XVIII Danau Salak	Danau Salak	Crumb rubber	2,400 tons/year
Banjarmasin	11. P.T.Batu Agung Mulia	Banjarmasin	Crumb rubber	6,000 tons/year
	12. P.T.Polymers Indonesia	Banjarmasin	Crumb rubber	6,000 tons/year
	13. P.T.Insan Bonafide	Banjarmasin	Crumb rubber	9,000 tons/year
	14. P.T.PD.Hok Tong	Banjarmasin	Crumb rubber	10,000 tons/year
Coconut				
Tapin	* 1. 38 small scale facilities	Rantau, etc.	Oil	30 tons/year
H.S.Selatan	* 2. 1 small scale facility	Kandangan	Oil	14 tons/year
H.S.Tengah	* 3. 1 small scale facility	Barabai	Oil	n.a
Tabalong	* 4. 1 small scale facility	Tanjung	Oil	n.a
Banjarmasin	5. Fauzi	Banjarmasin	Oil	1,000 tons/year
	6. C.V.Dini Karya	Banjarmasin	Oil	30 tons/year
	7. U.D.Kal-Sel Kencana	Banjarmasin	Oil	840 tons/year
	8. Rukun Tiga	Banjarmasin	Oil	n.a
	9. Mursid Arief	Banjarmasin	Oil	360 tons/year
	10. Gembira	Banjarmasin	Oil	240 tons/year
	11. Centre Oil Coconut	Banjarmasin	Oil	230 tons/year
Coffee				
Tapin	* 1. 7 small scale facilities	Rantau	Milled coffee	n.a
H.S.Selatan	* 2. 1 small scale facility	n.a	Milled coffee	n.a
H.S.Tengah	* 3. 1 small scale facility	n.a	Milled coffee	n.a
H.S.Utara	* 4. 1 small scale facility	Amuntai	Milled coffee	n.a
Tabalong	* 5. 3 small scale facilities	Tanjung	Milled coffee	4 tons/year
Banjarmasin	6. Seal of Kepala Kuda	Banjarmasin	Milled coffee	n.a
	7. Seal of Laba-Laba	Banjarmasin	Milled coffee	42 tons/year
	8. Seal of Kupu-Kupu	Banjarmasin	Milled coffee	2 tons/year
	9. Seal of Cangkir	Banjarmasin	Milled coffee	3 tons/year
	10. Merah Delima	Banjarmasin	Milled coffee	4 tons/year
Cocoa				
H.S.Tengah	* 1. P.T.Sapto Argo Unggul	Kec.B.A.Selatan	Fermentation	n.a

*: Processing facilities in the Study Area

Source: DINAS Estate Crops, South Kalimantan

Table 3.26 Agricultural Production Values

Product	Gross Production Values				Total Production Cost			Net Production Values			
	Unit/ Price (Rp/kg) (1)	Annual Production (t/year) (2)	Values (Rp million) (5=1x2)	Share in Sector (%) (4)	Share in Total (%) (5)	Area of Harvested (ha) (6)	Unit: Production Cost (Rp.1000/ha) (7)	Values ^{a/} (Rp million) (8=6x7)	Values (Rp million) (9=3-8)	Share in Sector (%) (10)	Share in Total (%) (11)
Food Crops											
Paddy	267	417,500	111,473	91.4	45.9	128,790	2.09	27,162	84,311	92.3	52.3
Maize	300	1,990	597	0.5	0.2	2,530	72.5	185	414	0.5	0.3
Cassava	85	12,410	1,055	0.9	0.4	1,710	142.0	243	812	0.9	0.5
Sweet potato	150	5,280	792	0.6	0.3	1,060	176.0	187	605	0.7	0.4
Soybeans	700	570	399	0.3	0.2	680	102.4	70	329	0.4	0.2
Groundnuts	885	3,270	2,894	2.4	1.2	3,710	290.6	744	2,150	2.4	1.3
Mungbeans	825	220	182	0.1	0.1	400	86.6	35	147	0.2	0.1
Vegetables	245	4,690	1,149	0.9	0.5	2,708	287	287	862	0.9	0.5
Banana	225	5,040	1,134	0.9	0.5	1,330	340	340	794	0.9	0.5
Rambutan	225	1,180	266	0.2	0.1	300	80	80	186	0.2	0.1
Citrus	1,000	1,300	1,300	1.1	0.5	340	975	975	325	0.4	0.2
Other fruits	360	1,890	680	0.6	0.3	560	238	238	442	0.5	0.3
Sub-total			121,920	100.0	50.2			30,543	91,376	100.0	56.7
Fishery											
Freshwater fish	1,316	39,780	52,350	100.0	21.5	478,970		14,920	37,431	100.0	23.2
Estate Crops											
Rubber	1,600	24,750	39,600	86.4	16.3	44,990	536.0	24,115	15,485	88.3	9.6
Coconut	175	14,510	2,539	5.5	1.0	16,240	136.8	2,222	318	1.8	0.2
Coffee	2,450	500	1,225	2.7	0.5	1,350		429	796	4.5	0.5
Cloves	6,000	150	900	2.0	0.4	1,120		315	585	3.3	0.4
Pepper	9,000	150	1,350	2.9	0.6	180		1,148	203	1.2	0.1
Others	400	530	212	0.5	0.1	620		64	143	0.8	0.1
Sub-total			45,826	100.0	18.9			28,291	17,535	100.0	10.9
Livestock											
Meat	1,900	4,420	8,398	36.6	3.5			2,939	5,459	36.6	3.4
Eggs	1,800	8,090	14,562	63.4	6.0			5,097	9,465	63.4	5.9
Sub-total			22,960	100.0	9.4			8,036	14,924	100.0	9.3
Total			243,056		100.0			81,790	161,266		100.0

Source: a/ DENAS Food Crops, Estate Crops, Livestock and Plantation

b/ Statistical Yearbook of South Kalimantan, 1983 ... 1987, Statistic Office, South Kalimantan, Statistics Office, South Kalimantan

c/ Tables in Annex D AGRONOMY

d/ Figures with asterisks are the estimated values.

Table 3.27 Crop Budget under Present Condition (Financial Price)

Item	Unit	(i) Existing Irrigation Scheme/ Rainfed Area			(ii) Existing Drainage and Polder/ Swamp Area		
		Qty	Price (Rp.)	Amount ('000Rp)	Qty	Price (Rp.)	Amount ('000Rp)
A. Gross Income							
- Yield	(ton)	2.5	267,000	667.5	1.5	267,000	400.5
B. Production Cost							
1) Farm Input							
- Seed	(kg)	25	270	6.8	20	270	5.4
- Fertilizer							
Urea	(kg)	100	135	13.5	0	135	0.0
TSP	(kg)	50	135	6.8	0	135	0.0
KCl	(kg)	0	135	0.0	0	135	0.0
- Agro-chemical							
Pesticide	(lit.)	3	5,200	15.6	0	5,200	0.0
Rodenticide	(kg)	3	1,500	4.5	0	1,500	0.0
	(Sub-Total)			47.1			5.4
2) Labour Requirement (m/d)							
- Family Labour		84	0	0.0	72	0	0.0
- Hired Labour		56	3,000	168.0	48	3,000	144.0
	(Sub-Total)	140		420.0	120		360.0
3) Miscellaneous							
- % of Sub-Total 1) and Hired Labour Cost		10		21.5	10		14.9
Total Production Cost				236.6			164.3
C. Net Return				430.9			236.2

Table 3.27(2) Crop Budget under Present Condition (Financial Price)

Item	Unit	(2) Maize		(3) Soybeans		(4) Groundnuts		(5) Mungbeans *1		
		Qty	Price (Rp.) ('000Rp)	Qty	Price (Rp.) ('000Rp)	Qty	Price (Rp.) ('000Rp)	Qty	Price (Rp.) ('000Rp)	
A. Gross Income										
- Yield	(ton)	0.7	300,000	0.7	700,000	0.8	885,000	0.5	825,000	412.5
B. Production Cost										
1) Farm Input										
- Seed	(kg)	30	500	30	1,250	50	2,500	25	900	22.5
- Fertilizer										
Urea	(kg)	0	135	0	135	0	135	0	135	0.0
TSP	(kg)	0	135	0	135	0	135	0	135	0.0
- Agro-chemical										
Pesticide	(lit.)	0	5,200	0	5,200	0	5,200	0	5,200	0.0
(Sub-Total)			15.0		57.5		125.0			22.5
2) Labour Requirement (m/d)										
- Family Labour		27	0	30	0	33	0	30	0	0.0
- Hired Labour		18	3,000	20	3,000	22	3,000	20	3,000	60.0
(Sub-Total)		45	54.0	50	60.0	55	66.0	50	60.0	60.0
3) Miscellaneous										
- % of Sub-Total 1) and 2)		5	3.5	5	4.9	5	9.6	5	4.1	4.1
Total Production Cost			72.5		102.4		200.6			86.5
C. Net Return			137.6		387.6		507.5			325.9

Table 3.27(3) Crop Budget under Present Condition (Financial Price)

Item	Unit	(6) Cassava		(7) Sweet Potato		(8) Upland Paddy		
		Q'ty	Price (Rp.) ('000Rp)	Q'ty	Price (Rp.) ('000Rp)	Q'ty	Price (Rp.) ('000Rp)	
A. Gross Income								
- Yield	(ton)	7.5	85,000	5.0	150,000	1.7	267,000	453.9
B. Production Cost								
1) Farm Input								
- Seed	(stick)	10,000	40.0	25,000	2	50.0	270	10.8
- Fertilizer								
Urea	(kg)	0	135	0	135	0.0	135	13.5
TSP	(kg)	0	135	0	135	0.0	135	6.8
- Agro-chemical								
Pesticide	(lit.)	0	5,200	0	5,200	0.0	5,200	10.4
	(Sub-Total)		40.0		50.0			41.5
2) Labour Requirement (m/d)								
- Family Labour		51	0	63	0	0.0	0	0.0
- Hired Labour		34	3,000	42	3,000	126.0	3,000	132.0
	(Sub-Total)	85	255.0	105	315.0	110	330.0	
3) Miscellaneous								
(% of Sub-Total 1 + Hired Labour Cost)		0	0.0	0	0.0	10	17.3	
Total Production Cost			142.0		176.0		190.8	
C. Net Return			495.5		574.0		263.1	

Table 3.27(4) Crop Budget under Present Condition (Financial Price)

Item	Unit	(9) Rubber		(10) Coconuts		
		Qty	Price (Rp.)	Qty	Price (Rp.)	Amount ('000Rp)
A. Gross Income						
- Yield	(ton)	0.6	1,600,000	0.9	175,000	157.5
B. Production Cost						
1) Farm Input						
- Fertilizer						
Urea	(kg)	0	135	0	135	0.0
TSP	(kg)	0	135	0	135	0.0
KCl	(kg)	0	135	0	135	0.0
- Agro-chemical						
Pesticide	(lit.)	0	5,200	0	5,200	0.0
	(Sub-Total)					0.0
2) Labour Requirement (m/d)						
- Family Labour		108	0	27	0	0.0
- Hired Labour		72	3,000	18	3,000	54.0
	(Sub-Total)	180		45		54.0
3) Miscellaneous						
(% of Sub-Total 1 + Hired Labour Cost)		40	86.4	20		10.8
Total Production Cost			302.4			64.8
C. Net Reserve			657.6			92.7

Table 4.1 Institutions for Agricultural Services at Province Level
in South Kalimantan

Institution	Location
General Agricultural Services	
1. KANWIL Agriculture	Banjarbaru
2. DINAS Food Crops	Banjarbaru
3. DINAS Estate Crops	Banjarbaru
4. DINAS Livestock	Banjarbaru
5. DINAS Fishery	Banjarbaru
6. KANWIL Forestry	Banjarbaru
7. DINAS Forestry	Banjarbaru
Research and Breeding	
1. Banjarbaru Research Institute for Food Crops (BRIFC)	Banjarbaru
2. Veterinary Research Station	Banjarbaru
3. Livestock Breeding and Feed Center	Pelaihari
Extension Services	
1. Agricultural Information Center	Banjarbaru
2. Food crops Protection Center	Guntung Payung
3. Seed Control and Certification Center	Banjarbaru
4. Agricultural Training Center	Binuang
5. Livestock Disease Investigation Center	Banjarbaru
6. Provincial BIMAS Secretariat	Banjarbaru
Agricultural Education	
1. Senior Highschool for Agriculture	Banjarbaru
2. Senior Highschool for Livestock	Pelaihari
3. Lambung Mangkurat University (Faculty of Agriculture, Fishery and Forestry)	Banjarbaru
Marketing Services	
1. P.T. Pertani	Banjarmasin
2. P.T. Pusri	Banjarmasin
3. Regional Logistics Depot (DOLOG)	Banjarmasin
Credit Services	
1. Bank Indonesia	Banjarmasin
2. Bank Rayat Indonesia (BRI)	Banjarmasin
3. Regional Development Bank (BPD)	Banjarmasin
4. Private Banks	
Irrigation, Drainage, Polder and O&M Services	
1. Sub-Dinas WRD, Provincial Public Works (DPU)	
Other Services	
1. KANWIL Transmigration	Banjarmasin
2. KANWIL Cooperative	Banjarmasin

Table 4.2 Paddy Area Covered by the Intensification Program by Island and Province in 1980-1986

(Unit: '000 ha)

	1980				1986			
	Intensi- fication	Non- intensifi.	Total	(% of Intensi.)	Intensi- fication	Non- intensifi.	Total	(% of Intensi.)
Java	4,637.5	561.0	5,198.5	(89.2)	5,846.2	46.7	5,892.9	(99.2)
Sumatera	1,108.1	1,018.1	2,126.1	(52.1)	2,046.8	334.0	2,380.8	(86.0)
Kalimantan	190.9	337.7	528.6	(36.1)	559.7	324.5	884.2	(63.3)
- W. Kalimantan	74.1	10.6	84.7	(87.4)	133.8	88.2	222.1	(60.3)
- C. Kalimantan	17.4	61.6	79.0	(22.0)	98.2	49.5	147.8	(66.5)
- S. Kalimantan	79.1	210.9	290.0	(27.3)	285.8	94.0	379.8	(75.3)
- B. Kalimantan	20.3	54.5	74.8	(27.1)	41.9	92.8	134.7	(31.1)
Sulawesi	360.0	412.3	772.4	(46.6)	849.6	100.6	950.2	(89.4)
Other Islands	329.7	160.4	490.0	(67.3)	476.3	117.4	593.7	(80.2)
Indonesia	6,626.2	2,489.4	9,115.6	(72.7)	9,783.6	923.3	10,706.9	(91.4)

Source: Supplemental Report on the Results of Intensification Program Implementation,
BIMAS Secretariat

Table 4.3 Location of Rural Extension Center (REC) in the Study Area in 1988

Kabupaten/ Location		Area Jurisdiction (Name of Kecamatan)	
Tapin			
1. Pulau Pinang	1. Benuang	2. Tapin Selatan	
2. Lok Paikat	1. Lok Paikat	2. Piani	
3. Pematang Kar. Hilir	1. Tapin Tengah	2. Bakarangan	
4. Baaua Padang	1. Tapin Utara	2. Bungur	
5. Margasari	1. Candi Laras Utara	2. Candi Laras Selatan	
6. Soato	1. Salam Babaris	2. Tapin Selatan	
H.S.Selatan			
1. Negara	1. Daha Utara	2. Daha Selatan	
2. Sungai Raya	1. Sungai Raya		
3. Bamban	1. Angkinang	2. Telaga Langsat	
4. Padang Batung	1. Padang Batung	2. Kandangan	3. Lok Sado
5. Simpur	1. Simpur	2. Kelumpang	
H.S.Tengah			
1. Kapar	1. Batang Alai Utara	2. Batang Alai Selatan	
2. Pantai Hambawang	1. Labuan Amas Selatan	2. Haruyan	
3. Kasarangan	1. Labuan Amas Utara	2. Pandawan	
4. Pagat	1. Batu Benawa	2. Barabai	
H.S.Utara			
1. Alabio	1. Alabio	2. Amuntai Selatan	
2. Kaludan	1. Amuntai Utara	2. Amuntai Tengah	3. Lampihong
3. Paringin	1. Paringin	2. Batu Mandi	3. Awaysan
4. Juai	1. Juai	2. Halong	
5. Danau Panggang	1. Babirik	2. Danau Panggang	
Tabalong			
1. Muara Uya	1. Muara Uya	2. Jaro	
2. Maburai	1. Tanta	2. Murung Pudak	
3. Kelua	1. Kelua	2. Banua Lawas	3. Pugaan
4. Tanjung	1. Tanjung	2.	
5. Wirang	1. Upau	2. Haruai	

Source: BIMAS Secretariat, South Kalimantan

Table 4.4 Number of Rural Extension Centers and Extension Agent
by Kabupaten in the Study Area in 1988

Kabupaten	BIMAS Kab. Office			Rural Extension Center			
	Office (No.)	PPS (prns)	PPM (prns)	Office (No.)	Chief (prns)	PPM (prns)	PPL (prns)
Tapin	1	3	12	6	6	30	57
H.S. Selatan	1	4	9	5	5	25	73
H.S. Tengah	1	2	10	4	4	20	68
H.S. Utara	1	1	10	5	5	25	63
Tabalong	1	2	11	5	5	25	56
Total	5	12	52	25	25	125	317

Source: Provincial BIMAS Secretariat, South Kalimantan

Table 4.5 Number of Extension Staffs by the Extension Field in the Study Area in 1988

(Unit: persons)

	Food Crop			Estate Crop			Livestock			Fishery			Total		
	PPS	PPM	PPL	PPS	PPM	PPL	PPS	PPM	PPL	PPS	PPM	PPL	PPS	PPM	PPL
Tapin	2	24	37	1	6	10	0	6	8	0	6	2	3	42	57
H.S. Selatan	2	19	51	1	5	10	1	5	8	0	5	4	4	34	73
H.S. Tengah	1	18	47	0	4	12	0	4	6	1	4	3	2	30	68
H.S. Utara	1	20	38	0	5	18	0	5	4	0	5	3	1	35	63
Tabalong	1	21	36	0	5	13	0	5	3	1	5	4	2	36	56
Total	7	102	209	2	25	63	1	25	29	2	25	16	12	177	317
(% of total)	(58.3)	(57.6)	(65.9)	(16.7)	(14.1)	(19.9)	(8.3)	(14.1)	(9.1)	(16.7)	(14.1)	(5.0)	(100.0)	(100.0)	(100.0)

Source: Provincial Secretariat of BIMAS, South Kalimantan Province

Table 4.6 Average Number of Farm Household per Extension Agent (PPL/PPM) in the Study Area, South Kalimantan and Indonesia

Study Area	Number of PPL&PPM by Extension Field b/			Number of Farm Households by Subsector c/			Number of Farm Household per PPL&PPM						
	Food Crop	Live-Stock	Fishery Estate	Food Crop	Live-Stock	Fishery Small Estate	Food Crop	Live-Stock	Fishery Estate	Total			
	(000 households)			(000 households)			(000 households)						
Tapir	311	54	41	88	494	21.0	79.6	155.7	455	321	512	965	315
H.S.Selatan	61	14	8	16	99	2.9	11.5	22.0	336	206	367	721	222
H.S.Tengah	70	13	9	15	107	5.4	15.2	30.1	390	187	601	1,011	281
H.S.Ubara	65	10	7	16	98	2.4	20.0	38.7	552	494	338	1,251	395
Tabalong	58	9	8	23	98	9.5	17.3	44.1	688	564	1,190	754	450
	57	8	9	18	92	0.8	15.6	20.9	314	250	86	866	227
South Kalimantan	762	91	60	153	1,066	42.8	158.8	319.4	376	409	714	1,038	300
Indonesia	22,162	2,170	1,698	6,075	32,105	1,481.1	11,744.0	19,504.8	738	2,066	872	1,933	608

a/: PPLs and PPMs in Agricultural Information Centers are not included.

Source: b/: Provincial BDMAS Secretariat in South Kalimantan and Staff Appraisal Report, Indonesia Third Agricultural Extension Project, June 1986, The World Bank

c/: Agricultural Census 1983, CBS

Table 4.7 Locations of BRI District Branch and Village Unit BRIs by Kabupaten in the Study Area

Kabupaten	BRI District Branches	Village Unit BRIs (Kecamatan)
Tapin	1 - Rantau	1 - Rantau Timur 2 - Rantau Barat 3 - Tambarangan 4 - Tambaruntung 5 - Binuang 6 - Margasari 7 - Pantai Cabe
H.S.Selatan	1 - Kandangan	1 - Pasar Antasari 2 - Angkinang 3 - Telaga Langsat 4 - Sungai Raya 5 - Negara
H.S.Tengah	1 - Barabai	1 - Pantai Hambawang 2 - Pagat 3 - Birayang 4 - Barikin 5 - Ilung 6 - Barabai Kota 7 - Kasarangan
H.S.Utara	1 - Amuntai	1 - Batu Mandi 2 - Paringin 3 - Lampihong 4 - Alabio 5 - Amuntai Tengah 6 - Aawayan 7 - Danau Panggang
Tabalong	1 - Tanjung	1 - Kelua 2 - Muara Uya 3 - Haruai 4 - Tanta
Total	5 - Branches	30 - Village Unit BRIs
South Kalimantan	11 - Branches	59 - Village Unit BRIs

Source: KANWIL BRI, South Kalimantan

Table 4.8 Location of BKK Units by Kabupaten in South Kalimantan

Kabupaten	Location of BKK Units (Kecamatan)
Tapin	1 - Binuang 2 - Tapin Utara 3 - Tapin Tengah 4 - Tapin Selatan 5 - Candi laras Utara 6 - Candi laras Selatan
H.S.Selatan	1 - Kandangan 2 - Angkinang 3 - Daha Utara 4 - Daha Selatan
H.S.Tengah	1 - Barabai 2 - Labuan Amas Selatan 3 - Labuan Amas Utara 4 - Batang Alai Selatan 5 - Batang Alai Utara
H.S.Utara	1 - Lampihong 2 - Sungai Pandan 3 - Amuntai Selatan 4 - Batu Mandi 5 - Paringin
Sub-total	20 - BKK Units
Banjar	1 - Gambut 2 - Sungai Tabuk 3 - Karang Intan 4 - Astambul 5 - Martapura 6 - Simpang Empat 7 - Kertak Hanyar 8 - Pengaron
Total in South Kalimantan	28 - BKK Units

Source: Bank Pembangunan Daerah (BPD), South Kalimantan

Table 4.9 State Bank Lending and Rediscout Rates and Percentage Refinancing Facilities Provided by Bank Indonesia

	Interest to Customer (% p.a)	Minimum Self- Financing by Customer Against the Total Funds Need (%)	Liquidity Credit	
			Amount	Interest Rate
			(%)	(% p.a)
Working Capital Credit				
- Integrated farmer credit (KUI)	12	0	100	3
- Permanent working capital (KMKP)	12	0	75	3
- National private estate credit (PSN)	12	25	75	3
- Credit to Cooperatives for the members thereof and in the framework of procuring goods of high priority	12	0	95	3
- Export credit	Stipulated by the relevant bank *	15	60	3
Investment Credit				
- Small investment credit (KIK)	12	0	80	3
- Estate credit:				
- Smallholders nucleous estate/PIR	12	0	80	3
- Rejuvenation, rehabilitation and expansion of export crops (PRPTE)	12	0	80	3
- National private estate (PSN)	12	10	85	3
- Paddy field bunding & levelling **	12	0	80	3
- Investment credit up to Rp 75 million	12	10	80	3
- Credit to Cooperatives for the member thereof and in the framework of procuring goods of high priority	12	0	90	3
Other Credit				
- Housing ownership credit (KPR)	5-9	10-20	80	3
- Indonesian students credit (KMI)	6	0	100	3
- Students dormitory credit	6	0	80	3

*: If the export has been actually realized, the interest rate shall be stipulated at 9% p.a.

** : Prior to granting credit to the farmers, it shall be channelled in the form of a direct credit by Bank Indonesia through the Ministry of Agriculture

Source: Bank Indonesia, Banjarmasin

Table 4.10 Credits Disbursement Amount by Economic Sector in South Kalimantan, 1980-1987

Economic Sector	1980	1981	1982	1983	1984	1985	1986	1987	Ave. Increase Rate		5 Year Average	
									(Rp million)	(% p.a.)	(Rp mil.)	(% cf total)
Agriculture	19,406	14,570	15,557	22,465	25,092	28,142	50,045	89,009	7.7	77.8	42,951	13.2
Mining	12	8	34	29	144	191	232	221	73.9	7.6	163	0.1
Industry	15,813	39,034	67,262	90,878	96,011	118,023	117,453	193,648	49.5	28.1	123,203	37.8
Electricity & water	9	8	84	1,137	1,355	1,856	2,161	2,252	190.3	10.2	1,752	0.5
Construction	7,239	10,683	14,742	14,214	27,827	15,458	16,245	10,225	16.4	-25.0	16,794	5.2
Trade	19,239	29,900	44,654	48,881	77,692	107,903	126,961	83,469	41.2	-13.7	88,981	27.3
Transportation	2,556	3,076	2,556	2,744	1,746	1,526	1,411	1,107	-10.9	-17.4	1,707	0.5
Services	2,932	3,893	2,659	5,248	2,538	11,094	12,091	12,427	30.5	5.8	8,684	2.7
Others	2,165	2,764	10,227	18,637	24,538	35,881	59,252	68,189	75.3	57.9	41,299	12.7
Total	69,371	103,936	157,755	204,233	256,963	320,074	585,851	460,547	35.8	20.0	325,534	100.0

Source: Bank Indonesia, Banjarmasin

Table 4.11 KUT Loan Amount Disbursed in the Study Area, South Kalimantan and Indonesia

Study Area	1985-86 Average		Farm Household	
	1985 ----- (Rp million)	1986 ----- (Rp million)	(Rp/farm)	(% of total)
	233.2	129.6	1,071	169.4
Tapin	5.9	16.8	469	24.2
H.S.Selatan	32.9	13.6	602	38.6
H.S.Tengah	144.6	70.1	2,662	40.3
H.S.Utara	24.0	9.5	366	45.8
Tabalong	25.8	19.6	1,113	20.4
South Kalimantan	350.5	254.4	947	319.4
Total Indonesia	11,185.7	12,435.1	606	19,504.8
				100.0

a/: Average amount of KUT loan per farm household:

This figure is calculated by applying a total number of farm households in each area based on the 1983 Agricultural Census, CBS

Source: Supplemental report on Intensification Program Implementation, 1985/86 and 1986/87.
BIMAS Secretariat

Table 4.12 Distributed Amount of Fertilizer by P.T. PUSRI by Kabupaten in South Kalimantan Province, 1984-1988

Kabupaten	1,984 (tons)	1,985 (tons)	1,986 (tons)	1,987 (tons)	Share a/ in 1987 (%)	Average Growth 1984-87(% p.a)
Tapin	1,257	1,713	3,365	2,664	8.8	28.5
H.S.Selatan	725	2,397	2,436	1,178	3.9	17.5
H.S.Tengah	2,163	1,871	3,974	3,370	11.1	15.9
H.S.Utara	185	417	133	79	0.3	-32.7
Tabalong	462	1,553	2,772	3,043	10.0	87.5
Sub-total	4,792	7,950	12,681	10,333	34.1	29.2
Tanah laut	2,966	5,693	6,775	11,886	39.2	58.8
Kota baru	5,657	3,649	2,333	2,467	8.1	-31.9
Banjar	3,662	3,901	4,278	4,490	14.8	7.0
Bawito kuala	659	1,071	1,391	1,146	3.8	20.3
Banjarmasin	3,609	13,977	19,946	29,891	-	102.3
South Kalimantan	21,344	36,240	47,403	60,213	100.0	41.3

a/: In the calculation, distributed amount in Banjarmasin is excluded, because most of all this amount is considered to be redistributed to other Kabupatens in the Province.

Source: P.T. Pusri, South Kalimantan

Table 4.13 Fertilizers Distributed through P.T. PUSRI in the Study Area by Kabupaten in 1987

Kabupaten	Urea		TSP		ZA		KCL		Total	
	(ton)	(%)	(ton)	(%)	(ton)	(%)	(ton)	(%)	(ton)	(%)
Tapin	1,322	(22.8)	1,114	(29.7)	5	(48.1)	223	(29.0)	2,664	(25.8)
H.S.Selatan	745	(12.8)	368	(9.8)	5	(51.9)	59	(7.6)	1,178	(11.4)
H.S. Tengah	2,079	(35.8)	1,213	(32.4)	0	-	78	(10.2)	3,370	(32.6)
H.S. Utara	55	(1.0)	23	(0.6)	0	-	1	(0.1)	79	(0.8)
Tabalong	1,609	(27.7)	1,026	(27.4)	0	-	408	(53.1)	3,043	(29.5)
Total	5,811	(100)	3,743	(100)	10	(100)	769	(100)	10,333	(100)
(% of total fertilizer)	(56.2)		(36.2)		(0.1)		(7.4)		(100)	

Source: P.T.Pusri, South Kalimantan

Table 4.14 Storage Capacity of P.T. PUSRI in the Study Area and South Kalimantan in 1988

Kabupaten/ Location	Storage (No.)	Capacity (ton)	Share	
			Study Area (%)	Province (%)
Tapin				
- Rantau	1	770	13.8	5.0
H.S.Selaten				
- Kandangan	1	3,000	53.7	19.6
H.S. Tengah				
- Barabai	1	880	15.7	5.8
H.S. Utara				
- Alabio	1	470	8.4	3.1
Tabalong				
- Tanjung	1	469	8.4	3.1
Sub-total	5	5,589	100.0	36.6
Tanah Laut				
- Pleihari	2	2,680		17.6
Banjar				
- Banjarbaru	2	3,500		22.9
- Lds. Ulin	1	3,000		19.6
Kotabaru				
- Pagatan	1	500		3.3
Total in South Kalimantan	11	15,269		100.0

Source: P.T. Pusri, South Kalimantan

Table 4.15 Number of Food Crop, Inland Fishery and Livestock Breeding Households Rendered Services from Village Cooperatives (KUD) in the Study Area

Services	Tapin		H.S. Selatar		H.S. Tenaah		H.S. Utara		Tabalong		Total	
	(No)	(%)	(No)	(%)	(No)	(%)	(No)	(%)	(No)	(%)	(No)	(%)
1. Saprotan a/	25	(0.1)	300	(1.1)	883	(2.4)	311	(0.7)	150	(0.8)	1,669	(1.1)
2. 1 + processing	0	(0.0)	25	(0.1)	25	(0.1)	0	(0.0)	125	(0.7)	175	(0.1)
3. 1 + selling	50	(0.2)	0	(0.0)	328	(0.9)	0	(0.0)	0	(0.0)	378	(0.3)
4. 1 + others	25	(0.1)	0	(0.0)	51	(0.1)	52	(0.1)	0	(0.0)	128	(0.1)
5. 2 + selling	0	(0.0)	25	(0.1)	0	(0.0)	0	(0.0)	0	(0.0)	25	(0.0)
6. 2 + others	0	(0.0)	0	(0.0)	0	(0.0)	0	(0.0)	0	(0.0)	0	(0.0)
7. 3 + others	0	(0.0)	0	(0.0)	0	(0.0)	0	(0.0)	0	(0.0)	0	(0.0)
8. 5 + others	0	(0.0)	0	(0.0)	0	(0.0)	0	(0.0)	0	(0.0)	0	(0.0)
9. Processing	276	(1.3)	101	(0.4)	76	(0.2)	76	(0.2)	503	(2.6)	1,032	(0.7)
10. 9 + selling	75	(0.3)	50	(0.2)	0	(0.0)	0	(0.0)	0	(0.0)	125	(0.1)
11. 9 + others	0	(0.0)	0	(0.0)	0	(0.0)	0	(0.0)	0	(0.0)	0	(0.0)
12. 10 + others	0	(0.0)	25	(0.1)	0	(0.0)	0	(0.0)	0	(0.0)	25	(0.0)
13. Selling	403	(1.9)	225	(0.8)	379	(1.0)	51	(0.1)	25	(0.1)	1,083	(0.7)
14. 13 + others	276	(1.3)	0	(0.0)	492	(1.1)	0	(0.0)	0	(0.0)	678	(0.5)
15. Others	1,355	(6.3)	100	(0.4)	1,104	(3.0)	279	(0.7)	503	(2.6)	3,341	(2.3)
16. Not reported	0	(0.0)	0	(0.0)	25	(0.1)	0	(0.0)	0	(0.0)	25	(0.0)
17. No services at all	450	(2.1)	500	(1.8)	2,189	(6.0)	661	(1.5)	1,103	(5.8)	4,903	(3.3)
18. Not a member of KUD	18,510	(86.5)	26,994	(95.2)	31,098	(85.1)	41,415	(96.7)	16,716	(87.4)	134,733	(90.8)
Total	21,445	(100.0)	28,345	(100.0)	36,560	(100.0)	42,845	(100.0)	19,125	(100.0)	148,320	(100.0)

a/: Saprotan, seeds, fertilizers, pesticides, etc.

b/: Food crop household; At least one member of a household is engaged in an activity in cultivating plants such as paddy, fruits and vegetables intending to sell or obtain income.

c/: Inland fishery household; At least one member of a household is engaged in an activity in cultivating fish in ponds, dykes or catching fish in rivers, swamps, lakes, etc. intending to sell or obtain income.

d/: Livestock breeding household; At least one member of a household is engaged in an activity in breeding livestock or poultry to sell and obtain income.

Source: Agricultural Census 1983

Table 4.16 O&M Staffing and Average Command Area of Cabang Dinas Water Resources Development by Kabupaten in the Study Area

	Cabang Dinas WRD (No.)	Command Area (ha)	Staff				Average Command Area Per Staff		
			Inspector (prns)	Overseer (prns)	Gate-keeper (prns)	Inspector (ha)	Overseer (ha)	Gate-keeper (ha)	
Tapin	1	19,760	3	8	0	6,587	2,470	-	
H.S.Selatan	1	15,330	3	8	0	5,110	1,916	-	
H.S.Tengah	1	9,670	4	8	0	2,418	1,209	-	
H.S.Utara a/	1	18,920	3	8	32	6,307	2,365	591	
Tabalong	1	4,670	2	3	0	2,335	1,557	-	
Total	5	68,350	15	35	32	4,557	1,953	-	

Note: a/: Including two overseers for pumping station in the column of overseer, and six pump operators in the column of gate-keeper.

Source: Sub-Dinas Water Resources Development, DPU, South Kalimantan, 1988

Table 4.17 Number of Water Users' Association and Member Farmers by Kabupaten in the Study Area and South Kalimantan

	Water Users' Association				Member Farmer			
	Active	Semi-active	Inactive	Total	Active	Semi-active	Inactive	Total
Study Area								
- Tapin	6	38	27	71	1,286	1,780	2,634	5,700
- H.S.Selatan	2	4	2	8	153	809	70	1,032
- H.S.Tengah	0	21	4	25	0	453	1,976	2,429
- H.S.Utara	4	4	2	10	1,133	230	54	1,417
- Tabalong	0	3	11	14	0	134	302	436
	0	6	8	14	0	154	232	386
South Kalimantan	7	60	53	120	1,906	4,880	4,000	10,786
Percent. Distribution								
Study Area								
- Tapin	8.5	53.5	38.0	100.0	22.6	31.2	46.2	100.0
- H.S.Selatan	25.0	50.0	25.0	100.0	14.8	78.4	6.8	100.0
- H.S.Tengah	0.0	84.0	16.0	100.0	0.0	18.6	81.4	100.0
- H.S.Utara	40.0	40.0	20.0	100.0	80.0	16.2	3.8	100.0
- Tabalong	0.0	21.4	78.6	100.0	0.0	30.7	69.3	100.0
	0.0	42.9	57.1	100.0	0.0	39.9	60.1	100.0
South Kalimantan	5.8	50.0	44.2	100.0	17.7	45.2	37.1	100.0

Source: Sub-Dinas Water Resources Development, DPU, South Kalimantan, 1988

FIGURES

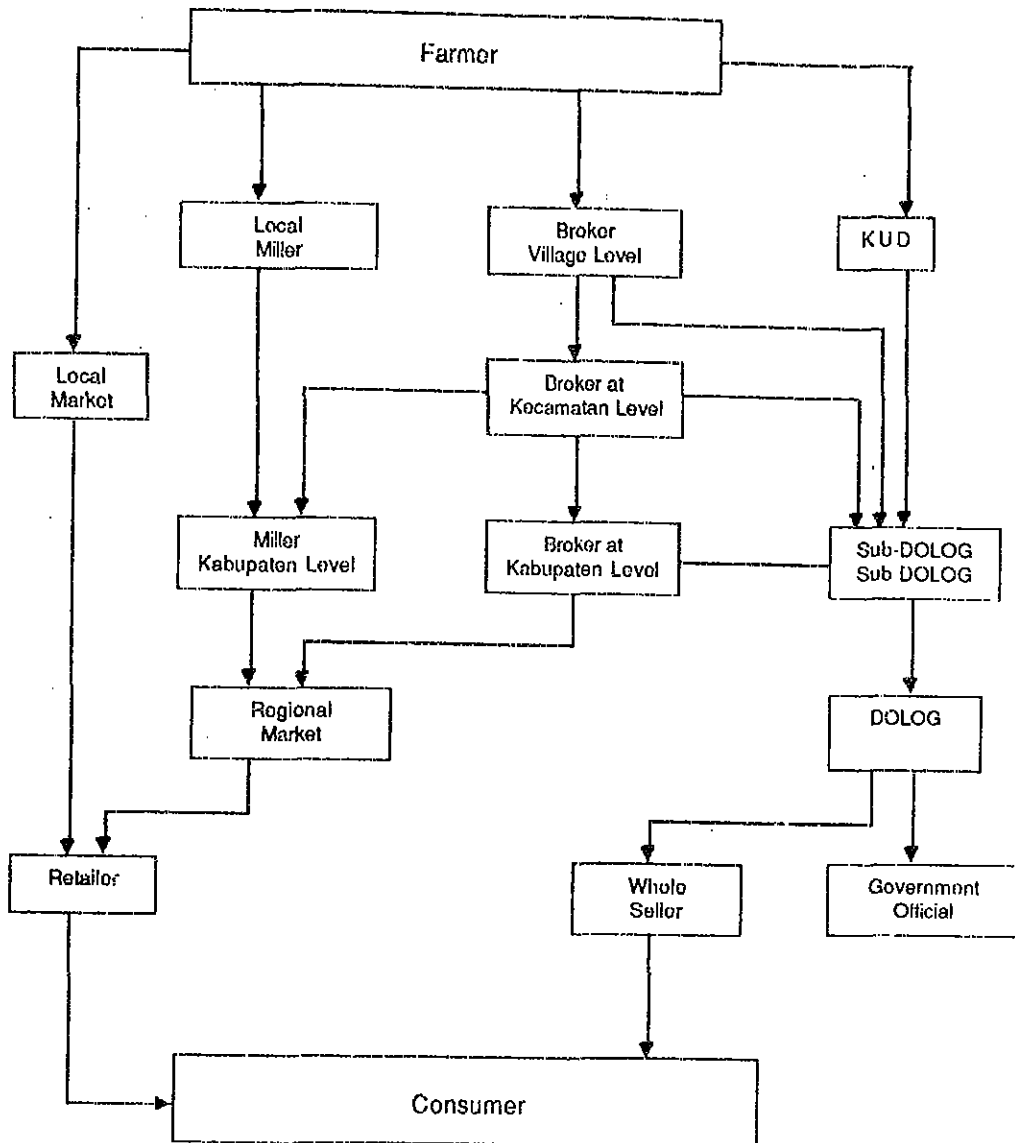


Figure 3.1 Rice Marketing Flow in South Kalimantan

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 DIRECTORATE GENERAL OF WATER RESOURCES DEVELOPMENT
 NEGARA RIVER BASIN OVERALL
 IRRIGATION DEVELOPMENT PLAN STUDY
 JAPAN INTERNATIONAL COOPERATION AGENCY

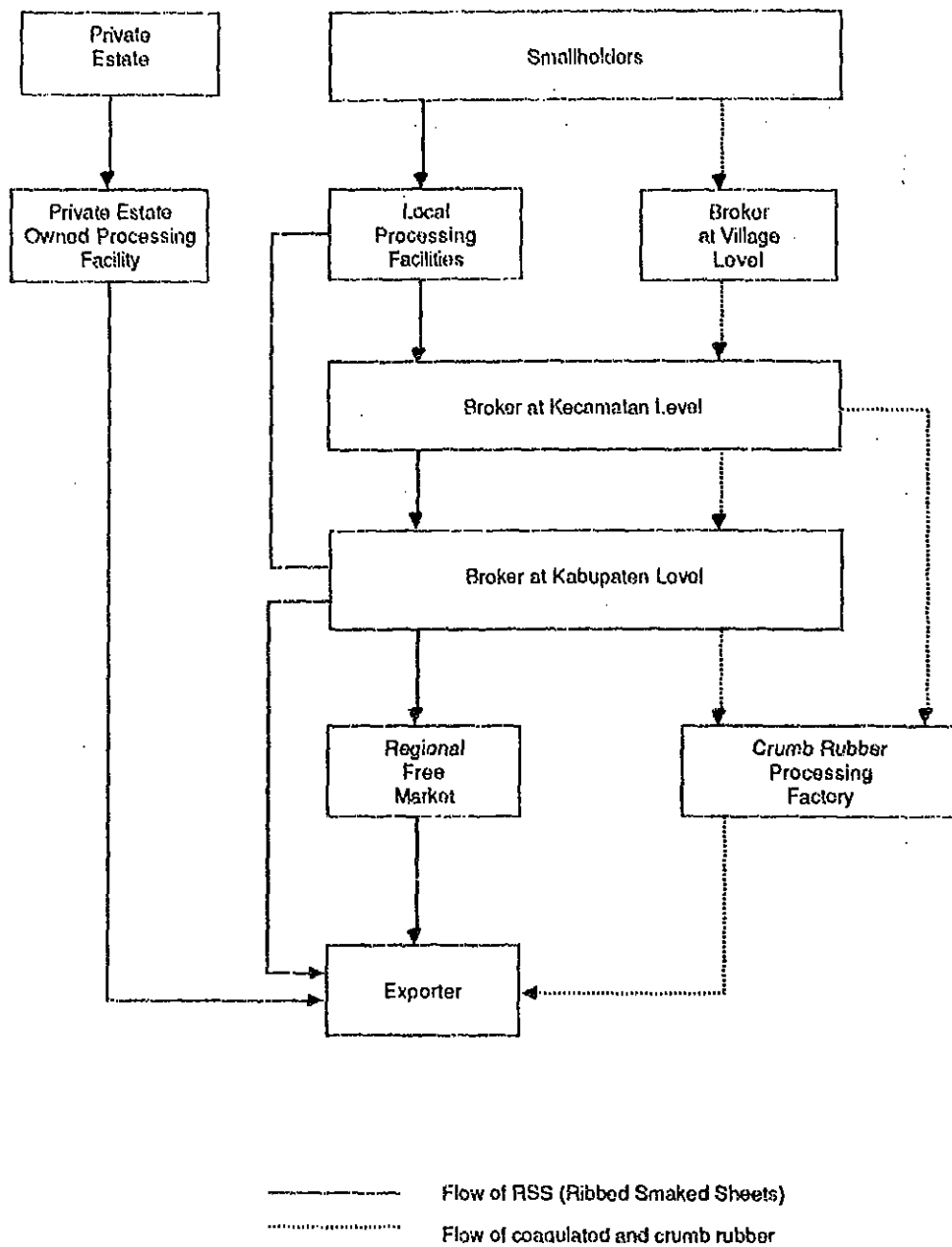


Figure 3.2 Rubber Marketing Flow in South Kalimantan

REPUBLIC OF INDONESIA
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 NEGARA RIVER BASIN OVERALL
 IRRIGATION DEVELOPMENT PLAN STUDY
 JAPAN INTERNATIONAL COOPERATION AGENCY

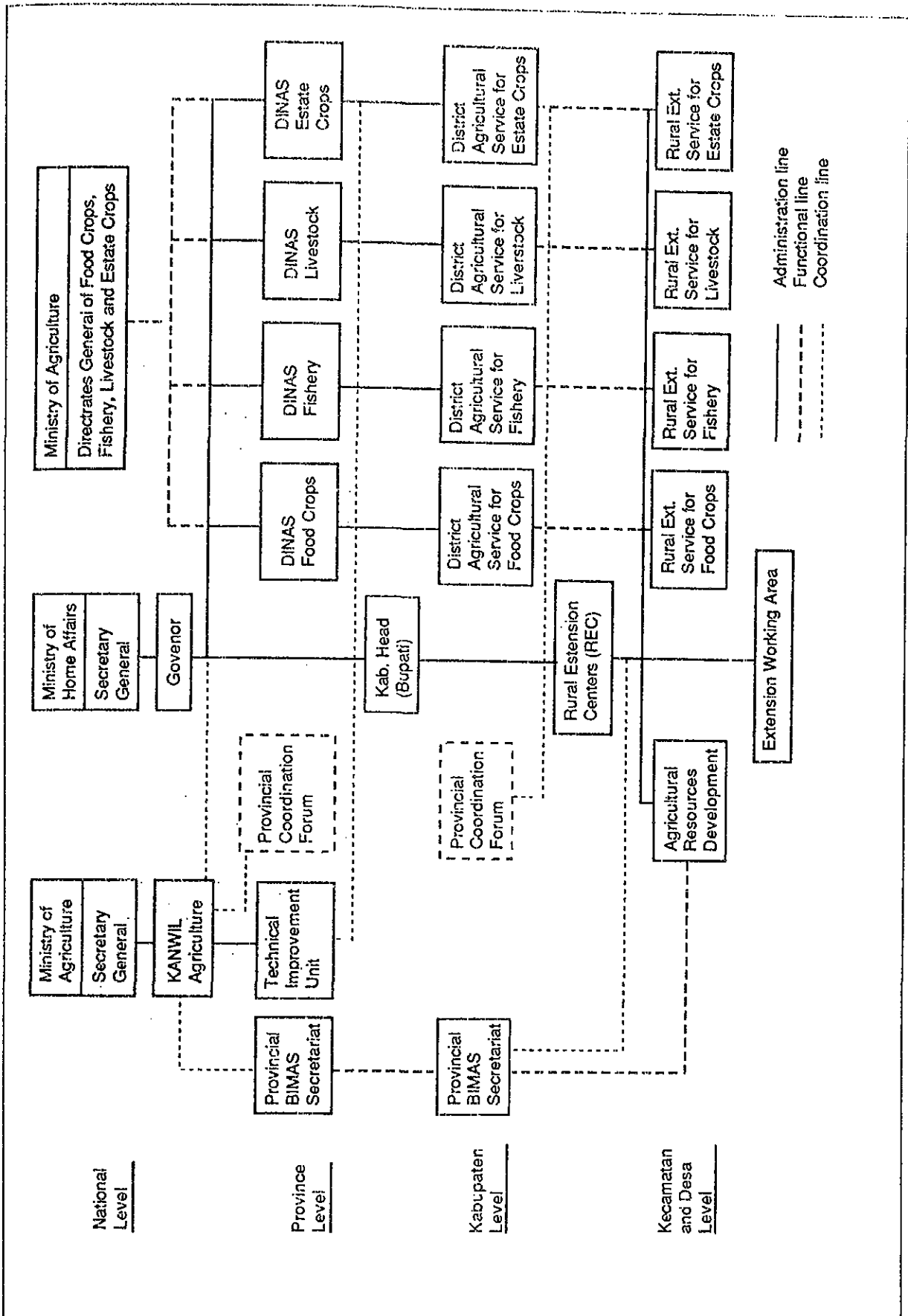


Figure 4.1 Outline of Agricultural Extension Services in South Kalimantan

REPUBLIC OF INDONESIA
 DEPT. OF WATER RESOURCES DEVELOPMENT
 NEGARA RIVER BASIN OVERALL
 IRRIGATION DEVELOPMENT PLAN STUDY
 JAPAN INTERNATIONAL COOPERATION AGENCY

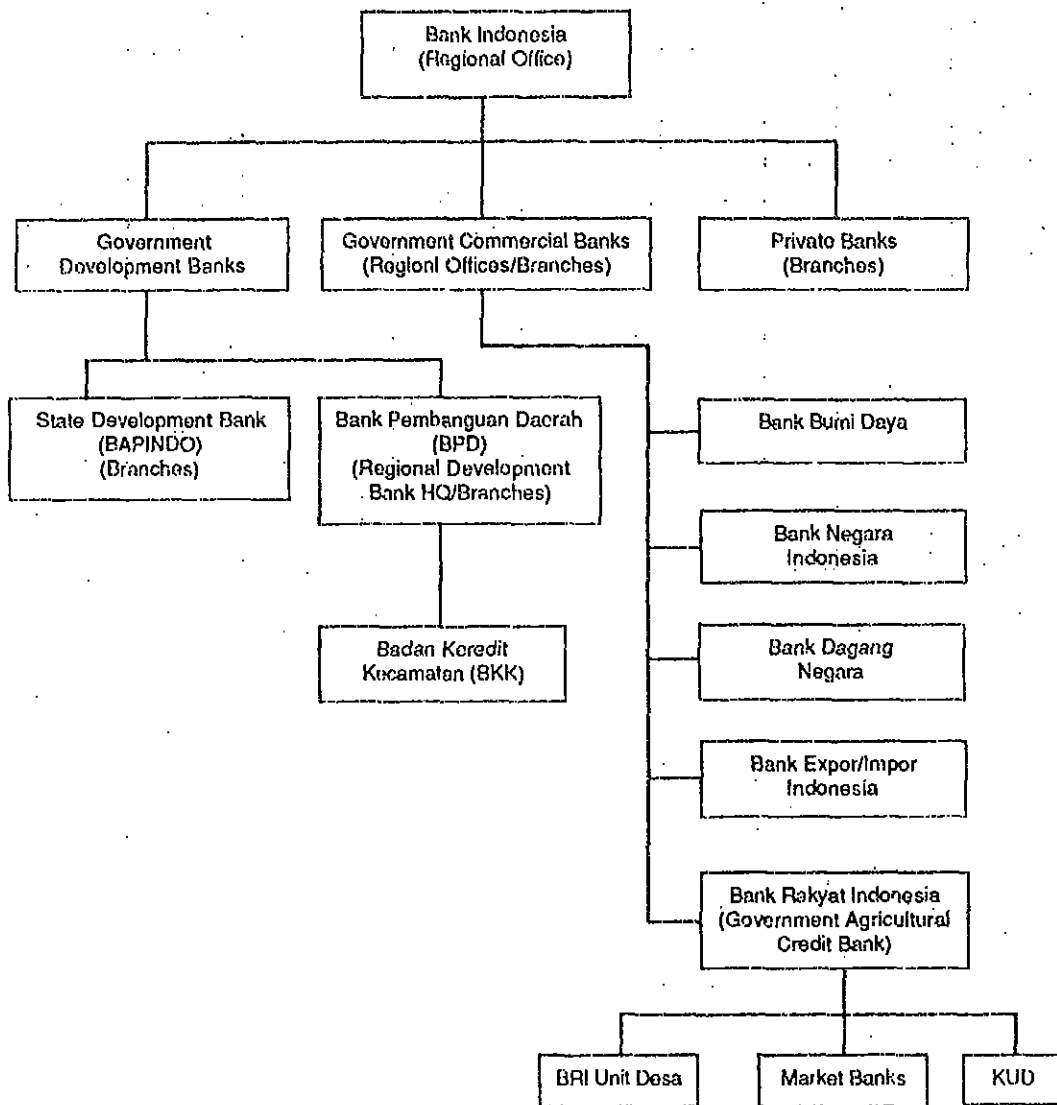


Figure 4.2 Institutional Credit System in South Kalimantan

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 NEGARA RIVER BASIN OVERALL
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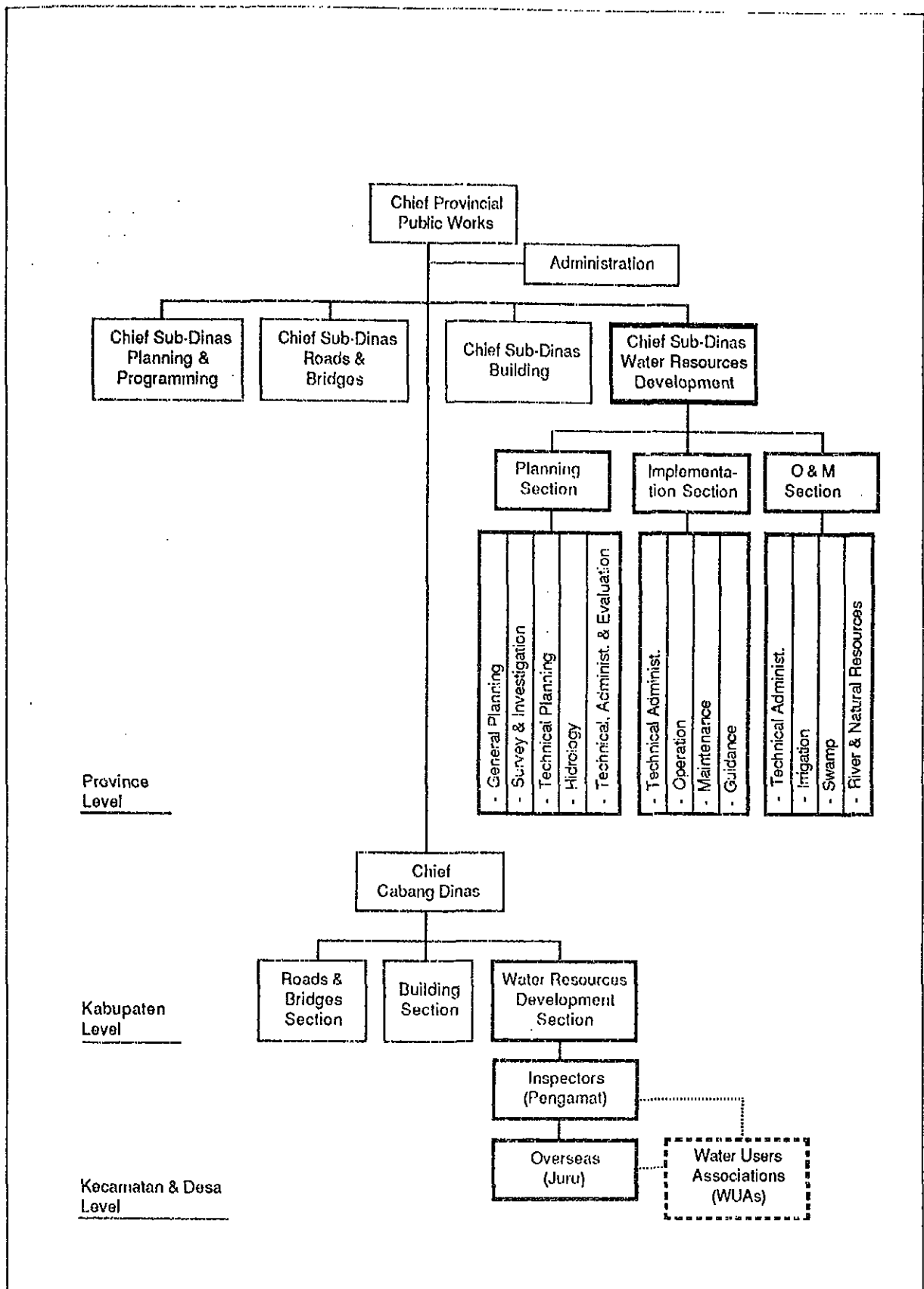
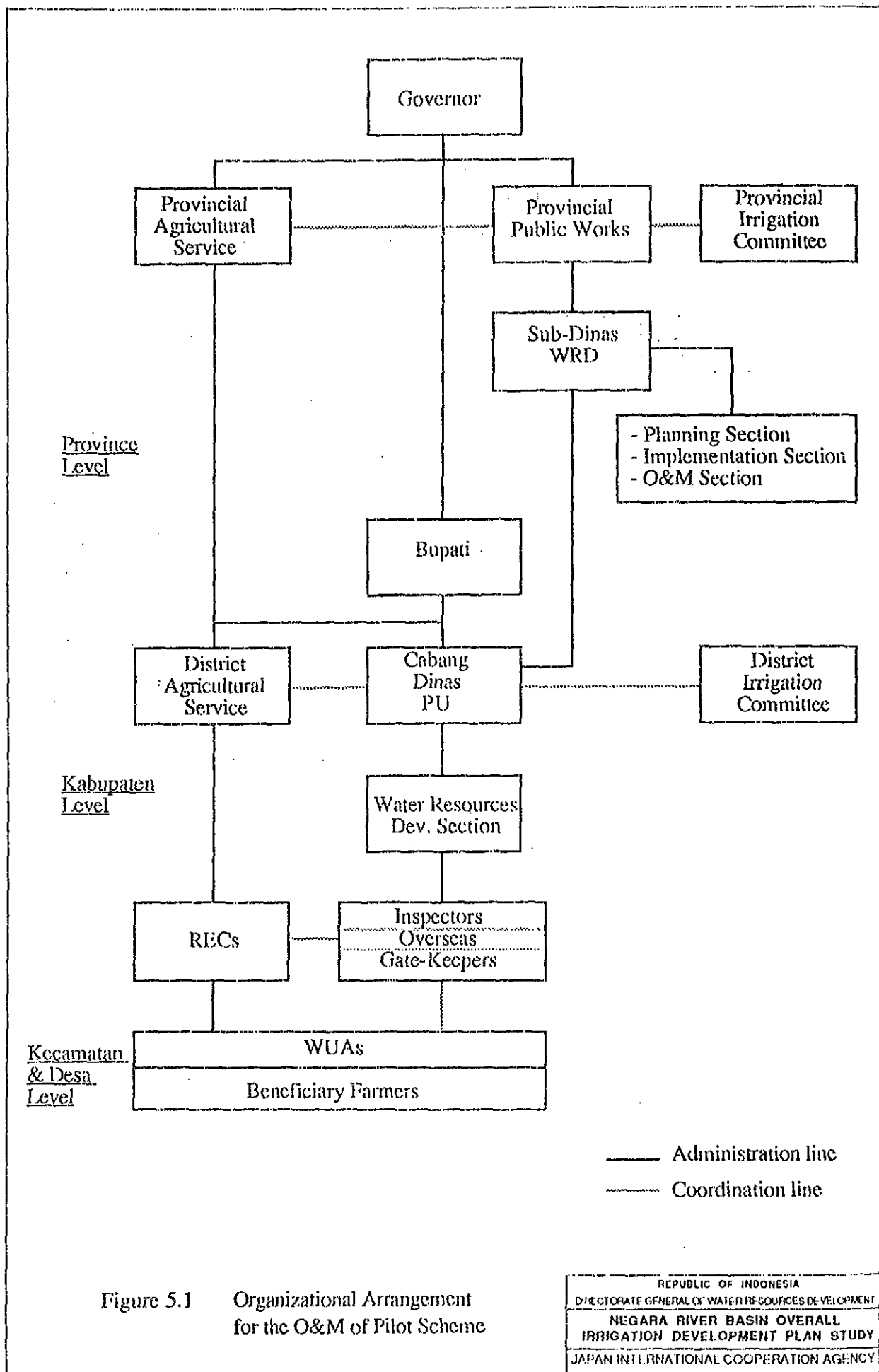


Figure 4.3 Organization Structure of Sub-Dinas Water Resources Development in South Kalimantan

REPUBLIC OF INDONESIA
 DIREKTORAT JENDERAL PENGEMBANGAN SUMBERDAYA AIR
 NEGARA RIVER BASIN OVERALL
 IRRIGATION DEVELOPMENT PLAN STUDY
 JAPAN INTERNATIONAL COOPERATION AGENCY



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ANNEX F
IRRIGATION

ANNEX F IRRIGATION

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1. INTRODUCTION

At present, DPUP South Kalimantan is carrying out 30 irrigation schemes in the Study Area. The total areas under DPUP's existing schemes are said to be 16,153 ha, out of which 9,651 ha have already been irrigated. The remaining 6,502 ha include rainfed paddy fields of 3,905 ha annually used and those of 2,597 ha which have been occasionally used but yet been converted to paddy fields. Beside this, 60,470 ha in alluvial plains and valleys are used for the cultivation of paddy which relies on water supplies from precipitation.

In the Study Area, there is an increasing need to stabilize the production of crops for food in the wet season and increase that in the dry season. In order to meet these irrigation needs, the increase of irrigation water supply and the extension of irrigation area must be realized. Among several measures under consideration, the development of new sources of water supply is the most important measure to be adopted as future plans.

As the diversion weirs of the existing schemes are located at the foots of hills with small catchment areas, the quantity of available river water is subject to limitations. For the effective use of limited water, it is necessary not only to construct a set of well-harmonized facilities, from main systems to tertiary systems, for the timely, equal and efficient supply and distribution of water, but also to establish an operation and maintenance organization so as not to let benefiting farmers, as well as the administration, waste even a drop of water.

2. EXISTING IRRIGATION SCHEMES AND WATER USE

2.1 The Level of Existing Irrigation Schemes

The planning and design concepts of the existing schemes are evaluated from the technical viewpoints under the present Study. The results reveal that there are many schemes where potential irrigation development areas have been overestimated because of insufficient hydrological analyses of water-supplying rivers. This point will be described in and after Chapter 4, and this Chapter 2 describes the state of existing irrigation facilities based on the data of DPUP South Kalimantan.

2.2 Distribution and Classification of Schemes

In five Kabupatens of the Study Area, 30 irrigation schemes are being carried out covering a total irrigable area of 15,090 ha. This is the DPUP's recent figure revised by DPUP on its own estimates. As shown in Table 2.1, 23 irrigation schemes concentrate in Kabupatens Hulu Sungai Tengah, Hulu Sungai Selatan and Tapin which are all located in the southern part of the Study Area; the total irrigation scheme areas in these Kabupatens are 12,765 ha. The number of schemes and DPUP's revised irrigation areas by Kabupaten are as follows:

Kabupaten	No. of Scheme	DPUP's Revised Irrigation Area (ha)
Tabalong	3	1,079
H.S.U.	4	1,246
U.S.T.	8	4,635
H.S.S.	8	4,620
Tapin	7	3,510
Total	30	15,090

Beneficial paddy fields in the Study Area under irrigation schemes are mainly located at the lower part of the alluvial plains. The highest part of the benefiting paddy fields extends to the foot of hill areas.

The progress and distribution of existing irrigation schemes by Kabupaten are shown in Table 2.1. Out of 30 schemes, irrigation water has been supplied to 28 schemes covering a total area of 9,651 ha. As construction of facilities has yet been uncompleted, the remaining 5,439 ha are rain-fed paddy fields annually or occasionally used.

The present levels of irrigation systems are classified into such 3 systems as simple technical irrigation, semi-technical irrigation systems and technical irrigation systems. The definition of these systems is as follows:

- 1) Technical irrigation system: This is the irrigation system consisting of diversion weirs, main and secondary canals, diversion works and turnouts with measuring devices. The main systems are constructed, operated and maintained directly by the DGWRD, while the tertiary system is fully developed and operated under the farmers responsibility.
- 2) Semi-technical irrigation system: Only the diversion facilities are constructed as permanent or semi permanent structures by the DGWRD's, while the construction of canals is carried out by Kecamatan. Operation and maintenance are carried out directly by farmers.
- 3) Simple irrigation system: This is the small irrigation system with headworks as temporary structure. The construction and maintenance of the structures are financed by Kecamatan.

In the Study Area, there exist 10 technical; 11 semi-technical and 9 simple irrigation schemes as shown in Table 2.1 and summarized below.

Level of Irrigation System	No. of Scheme	Benefitted Area (ha)
Technical	10	9,452
Semi-technical	11	3,736
Simple	9	1,902
Total	30	15,090

2.3 Features of Schemes

The existing irrigation schemes depend on tributaries of the Negara river for sources of water supply. These tributaries flow into the main stream from the east of the Negara river. As diversion weirs have been constructed on these tributaries at the foot of hills, their catchment areas are small. Furthermore, the irrigation command area is small owing to topographical restrictions. The quantity of water available in these tributaries is limited so that the command areas of 20 irrigation schemes cover an area of 400 ha or less. In the dry season, the available natural flows of these small rivers are extremely small and quite often run dry. For this reason, the existing irrigation facilities can only supply water for paddy cultivation during the wet season.

2.4 Present Condition of Facilities

As diversion weirs are located at the foot of hills, runoffs from catchment areas to diversion weirs are very rapid. Therefore, all gabions used as diversion weirs in the simple irrigation schemes have been collapsed and carried away. As many as 10 diversion weirs which were constructed in the 1930s have become so deteriorated that they have such problems as leakage from weir bodies, seepage into lower parts of weir bodies and scouring of downstream aprons. Among diversion weirs constructed lately, some were not designed against piping which must be considered in the design stage and seepage water has broken foundation grounds.

There is another topographical factor affecting the performance of diversion weirs. Main canals of irrigation schemes run along contour lines at the foot of hills. Soils washed out from hillsides directly enter canals, reduce the maximum design flow of canals and break them. In addition, lack of any preventive measures against highly permeable soils results in leakage from earth canals and collapses of slopes. These conditions have extremely impaired function of irrigation canals. There are some cases that water cannot be delivered to paddy fields because of upturned gradients or improper canal bed elevations caused by improper design or construction. Further, an expected amount of water cannot be delivered to tertiary canals because of overflowing of water from main canals. There are not enough tertiary canals. Irrigation schemes where tertiary systems are provided are not functioned well because of leakage, collapse of slopes, disconnection of canals, irresponsible withdrawal by farmers and overgrown weeds inside canals.

Other common problems include breakdown of diversion facilities, loss of gates, and sedimentation in drainage canals.

The existing irrigation schemes with such problems are summarized as follows:

(1) Kabupaten Tabalong

- 1) Jaro scheme: Some concrete surfaces of fixed weirs have been peeled off.
- 2) Jaro Bawah scheme: The headworks using gabions were constructed in 1981 but collapsed in the same year. The construction of canal facilities has been left to farmers. At present, these canal facilities are not working and cause this scheme to be unirrigated.
- 3) Gumba scheme: Irrigation systems are not yet working. There is enormous leakage from the intake weir on the right bank.

(2) Kabupaten Hulu Sungai Utara

- 1) Paran scheme: The head reach canal on the left bank is defective and intaked water overtops the crest of the canal. The design discharge therefore cannot be conveyed to the lower reaches.
- 2) Lok Batu scheme: The canal connected with the intake of the right bank runs along a steep mountainside. Therefore sediment from the mountain enters the canal and hinders the designed functions of the canal. Water flowing down rapidly from mountains damages the canal. As the intake weir of the right bank is broken and inflow therefrom cannot be controlled, the design headwater level cannot be guaranteed at the left bank intake site.

(3) Kabupaten Hulu Sungai Tengah

- 1) Baruh Hawang scheme: In the main canal, there is a place with upturned gradient which prevents water flow.
- 2) Intangan scheme: No riprap works were provided below the downstream apron of the headworks. Therefore, sand and gravel just under the apron, especially on the left bank side, were washed away by scouring. The apron has been collapsed due to subsidence. Early repair and riprap works are needed.

(4) Kabupaten Hulu Sungai Selatan

- 1) Nunungin scheme: Limestones used for masonry intake weirs have dissolved. As a result, a considerable amount of leakage is common through

the intake weir body. Therefore, water level cannot reach to the design headwater level even in the wet season. Because of this, paddy fields in the command area have been fed by rain. The headworks need to be renewed.

- 2) Kuangan scheme: The main canal after the intake weir runs along a steep mountainside. The canal is not functioning because of sedimentation and rapid flow from the mountain.
 - 3) Hawatu scheme: The headworks have completely been collapsed. As the canal runs in the mountain area, it was cut deeply and perpendicularly. Without any linings, the side walls of the canal have been collapsed and the bottom is deposited, resulting in overtopping at some places. All facilities need to be rehabilitated.
 - 4) Taal scheme: Discharge has scoured the side walls of the earthen canal, causing to enlarge the cross section of the canal. Because of the enlarged cross section, the canal can be fitted to the transition of the structure, and water is intruding into the back side of the transition walls. The structure will subside unless it is repaired early.
 - 5) Jarau scheme: Piping at the headworks has been loosening the foundation ground. Because of the insufficient capacity of drainage culverts that cross the irrigation canal, runoffs from neighboring areas cannot pass through the culverts and part of runoffs flow into irrigation canals. Such overflowing of drained water damages irrigation canals.
- (5) Kabupaten Tapin
- 1) Pampain scheme: Seepage water coming from the upstream side of the headwork is effusing through the side wall of the canal on the right bank. Trees that grow in the river channel below the headwork prevent the smooth flow. These cause the downstream water level to raise and the weir to be submerged with a rainfall.
 - 2) Binuang scheme: The scouring sluice gate does not work properly so that sediment in front of the intake cannot be removed. The effective water depth is presently about 75 cm. As a result, it becomes difficult to take the design discharge at the weir site.

2.5 Operation and Maintenance

Although most of the existing irrigation schemes have own water management organizations, beneficial farmers live far away from their paddy fields and apart from each other. As a result, it is difficult to organize these beneficial farmers when operation and

maintenance works are carried out in the group work manner. Further, operation and maintenance organizations do not function as intended in some schemes.

The fact that many landowners are nonresident causes an obstacle to organize beneficial farmers. Tenant farmers have no intention to participate in the operation and maintenance works and are commonly carrying out selfish withdrawal of water.

Another serious obstacle to proper water management is some influential residents' irresponsible activities. They make fish ponds within irrigation scheme areas, and withdraw irrigation water disorderly and drain directly into nearby rivers.

2.6 Constraints

In the existing irrigation schemes where the quantity of available water is limited, it is essential for utilizing limited water in an effective manner to construct a well-balanced facilities from the main to tertiary systems. However, beneficial farmers are not willing to allow such tertiary canals to be laid in their own farmlands because they do not want to reduce their lands. Without any thorough understanding of these farmers, effective use of water will not be accomplished even with complete main systems.

3. IRRIGATION WATER DEMAND

3.1 Calculation Procedures

The reliable data on the unit water requirements of the neighboring Riam Kanan Project are used for calculation because of the unavailability of data on that of the Study Area. When unit water requirements are calculated, however, water for the dilution of acid water, which was estimated to be 2 mm/day under Riam Kanan Irrigation Project, is not taken into account, this judgment being taken on the basis of the conditions of the Study Area. The followings are the basic items considered in the calculation of net irrigation requirements.

(1) Estimation of potential crop evapotranspiration by pan evaporation method

(2) Cropping pattern

- Period of transplanting 20 days
- Period of wet season paddy 135 days or 140 days
- Period of dry season paddy 120 days
- Period of maintenance of main canal 40 days

(3) Crop coefficient and consumptive use of water

Wet season paddy

1/3 month	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th
Growing Stage(%)	9	18	27	36	45	55	64	73	82	91	100
Crop Coefficient	0.84	0.95	1.06	1.17	1.28	1.34	1.37	1.27	1.14	0.96	0.67

Dry season paddy

1/3 month	1st	2nd	3rd	4th	5th	6th	7th	8th	9th
Growing Stage(%)	11	22	33	44	56	67	78	89	100
Crop Coefficient	0.68	0.99	1.14	1.27	1.34	1.37	1.21	1.01	0.67

Consumptive use of water

= Pan evaporation (for 10 days) x Crop coefficient

(4) Net irrigation requirement

$$R_n = a \times (C_o - E_r) + P_u + N_r$$

R_n : net irrigation requirements (mm)

a : crop intensity

C_o : consumptive use in paddy fields (mm) = $C_u + P$

C_u : consumptive use (mm)

P : percolation loss (mm)

E_r : effective rainfall (mm)

P_u : water requirement for puddling works

N_r : water requirement for nursery bed (mm)

(5) Percolation loss (by actual measurement)

In dry season 1 mm

In wet season 0.5 mm

(6) Effective rainfall

Effective rainfall is calculated by Daily Water Depth Balance Method making the following assumptions:

- 1) Daily rainfalls of 5 mm or less are regarded as ineffective.
- 2) The storage of paddy fields is 100 mm.
- 3) If the storage balance of the previous day is 25 mm or less, 50 mm irrigation is made

(7) Water requirements for puddling works and water requirement for nursery bed

Water requirement for puddling works	120 mm
Water requirement for nursery bed	270 mm

Assuming that the areas of nursery bed is one twentieth of the cropping areas, water requirement during the period of nursery bed is 14 mm ($270/20 = \text{about } 14 \text{ mm}$).

3.2 Irrigation Diversion Requirements

Irrigation diversion requirements are calculated by considering operation loss and conveyance loss, and net irrigation requirements at farm level are calculated by irrigation efficiencies. Irrigation efficiencies are calculated by the following assumptions of operation losses and conveyance losses of main canals, secondary canals and tertiary canals.

Description	Main Canal	Secondary Canal	Tertiary Canal	Total
Operation losses	5%	5%	5%	15%
Accumulated losses	15%	10%	5%	-
Efficiency (A)	85%	90%	95%	-
Conveyance losses	5%	10%	5%	20%
Accumulated losses	20%	15%	5%	-
Efficiency (B)	80%	85%	95%	-
Overall efficiency (C = A x B)	68%	76.5%	90%	-

The calculation result of diversion requirements is shown in Table 3.1.

4. POSSIBILITIES OF FUTURE IRRIGATION DEVELOPMENT

4.1 Potential Irrigation Development Area

The present condition of the irrigation schemes managed by DPUP South Kalimantan is shown in Table 2.1, based on the answers to the questionnaires distributed by the Study Team to its branches. The answers revealed that the goal of the scheme had not been attained in 28 schemes because of technical, social or financial factors. As to schemes where the delay of the annual budgets obstructs the attainment of the goal, the areas presently not yet irrigated are included in irrigable areas.

At the Gunba scheme in Kabupaten Tabalong, headworks, a main canal and a secondary canal were already completed in 1985/1986, but these have not yet been put into operation because of the problems of landownership between the landowner and beneficial farmers.

Although it may take a considerable time to settle the dispute, the scheme area of 254 ha can be included into the irrigable areas.

By referring to the result of hydrological analysis in Annex B, water availability at intake sites is reviewed for the existing 30 irrigation schemes on the basis of non-exceedance probable discharge in five years as shown in Table 4.1. Taking into account the review result, the DPUP's original irrigation area is re-estimated as shown in Table 4.2. The summary of re-estimated irrigable areas is below. In the present Study, the re-estimated irrigable area is defined as the irrigation scheme area.

Kabupaten	No. of Schemes	DPUP's Original Irrigation Area (ha)		Re-estimated Irrigable Area (ha)	
		Wet Season	Dry Season	Wet Season	Dry Season
Tabalong	3	1,079	436	1,079	674
H.S.U.	4	1,246	133	653	347
H.S.T.	8	4,635	955	4,231	3,386
H.S.S.	8	4,620	1,050	2,426	770
Tapin	7	3,510	175	2,658	964
Total	30	15,090	2,749	11,047	6,141

Out of the existing 30 irrigation schemes in the Study Area, 14 schemes have reasonable plannings, while the remaining 16 schemes have inadequate plannings. The design capacities of existing facilities range between 85% and 360% compared with hydrological water balance.

4.2 Development Possibilities of New Irrigation Schemes without Dam Construction

4.2.1 Areas to be newly irrigated

(1) Background

In the Study Area, there is an increasing need to stabilize the production of crops for food both in the wet and dry seasons. In order to meet these needs, the increase of irrigation water supply and the extension of irrigable area are prerequisite. Among several measures under consideration, the development of new water sources is one of the most important measures to be adopted in future planning.

If there are no suitable dam sites to be constructed, additional areas to be irrigated are estimated by placing major emphasis on the precise estimation of the quantity of available water and the selection of areas to which irrigation water supply is topographically feasible.

(2) Conditions for the estimation of areas to be irrigated

The gravity irrigation system without a reservoir is a given condition. Areas to be irrigated are estimated at suitable locations both for water sources and water conveyances. In connection with locations of water sources, approximate water-supplying facility sites are selected at higher parts of areas to be irrigated. Especially, places just below confluences are picked up as possible sites where inexpensive water intake can be attained. With respect to water conveyances, following points are taken into considerations: selection of canal routes which connect the above water-supplying facility sites with areas to be irrigated as straight as possible or with shorter distance as possible; leveling between cuts and fills in canals; and headrace routes at higher elevations.

The above estimation by using 1/50,000 topographic maps is further confirmed through on-the-spot surveys.

(3) Available land resources for irrigation development

The existing paddy fields with an area of 74,026 ha in alluvial plains and valleys which are not waterlogged throughout the year are selected as the possible land resources for irrigation development in the Study Area. An area of 11,047 ha out of 74,026 ha is included in the existing irrigation schemes. As shown below, the remaining 62,979 ha are rain-fed paddy fields.

(Unit : ha)

Kabupaten	Existing Paddy Field	Existing Irrigation Scheme Area	Remaining Paddy Field
Tabalong	7,000	1,079	5,921
H.S.U.	9,490	653	8,837
H.S.T.	37,755	4,231	33,524
H.S.S.	12,500	2,426	10,074
Tapin	7,281	2,658	4,623
Total	74,026	11,047	62,979

(4) Classification of remaining rain-fed paddy fields by topographical conditions

The basis of the irrigation development planning in the Study Area is the gravitational irrigation method in line with the DGWRD's policy. The distribution and topographical conditions of rain-fed paddy fields in the alluvial plains and valleys are examined. As a result, 16 areas are delineated as topographically irrigable area of 32,243 ha as shown in Table 4.3. The topographically irrigable area includes a DPUP's planned area of 300 ha.

(Unit : ha)

Kabupaten	Remaining Paddy Field	Topographically Irrigable Area			Total
		Remaining Paddy Field	Paddy Field in Swamp Area	Bush in Alluvial Plain	
Tabalong	5,921	2,844	0	0	2,844
H.S.U.	8,837	5,906	785	0	6,691
H.S.T.	33,524	8,501	1,400	0	9,901
H.S.S.	10,074	6,779	0	0	6,779
Tapin	4,623	3,528	400	2,100	6,028
Total	62,979	27,558	2,585	2,100	32,243

(5) Quantity of available water at new water-supplying facility sites

In order to have a proper irrigation plan for each irrigable area selected, quantities of available discharges at each new water-supplying facility site are examined on the basis of non-exceedance probable discharge in 5 years as shown in Table 4.4.

(6) Scale of development

Out of the irrigable areas of 32,243 ha topographically selected, 31,972 ha are concluded to be the proper scale of new irrigation schemes taking into consideration the limitations of water resources. Among the balance, 271 ha in Kabupaten Tabalong are cancelled because the quantity of available water in the Jaro and Namun rivers is too small to irrigate these irrigable areas. In Kabupaten Hulu Sungai Utara, water supply to paddy fields in the swamp area is possible only for the dry season. The number of new irrigation schemes is 15 as shown in Table 4.5. In Kabupaten Tabalong, irrigation water for new irrigation schemes, Sungai Kati and Batupulut, are supplied by the existing Jaro Bawah scheme and the new Mihim scheme, respectively. It is possible to supply irrigation water for the dry season to 28,373 ha including paddy fields of 2,585 ha in the swamp area.

4.2.2 Alternative considerations for irrigation water supply to existing schemes

Among newly identified water source facilities, Pitap, Batang Alai, Barabai, Amandit and Tapin weirs can divert a plenty of river discharge to meet irrigation water demand not only for new irrigable areas but also for the existing irrigation schemes as below.

(Unit: ha)

Water Source	Potential Area		Scheme Area		Available Area	
	Wet Season	Dry Season	Wet Season	Dry Season	Wet Season	Dry Season
Pitap	16,186	5,521	3,734	3,734	12,452	1,787
Batang Alai	18,288	8,694	6,223	6,223	12,065	2,471
Barabai	9,202	4,374	2,278	2,278	6,924	2,096
Amandit	16,984	5,393	6,432	5,393	10,552	0
Tapin	12,131	3,852	5,328	3,452	6,803	400
Total	72,791	27,834	23,995	21,080	48,796	6,754

The balance between the potential and scheme areas can be considered as extra water resources for enhancement of irrigation water supply to the existing schemes,¹⁴

24 irrigation schemes of which are under shortage of water sources in either wet or dry season as shown in Table 4.2, and all drainage schemes of which are not provided by any technical irrigation system. The following is alternative considerations with regard to irrigation supply to these existing schemes by allocation some portions of the above available area.

(1) Irrigation water supply to the existing drainage schemes

New water-supplying facilities at Pitap, Batang Alai, Barabai and Tapin can supply irrigation water to paddy fields of the following drainage schemes as discussed in Section 4.2.1, and as shown in Table 4.5.

Water Source	Existing Drainage Scheme	Wet Season (ha)	Dry Season (ha)
Pitap	R. Batu Mandi	-	785
Batang Alai	Tg. Semanggi Kambat	600	600
Barabai	Tg. Jaranih	800	800
Tapin	5bh Pintu Air	400	400
Total		1,800	2,585

(2) Supplemental water supply to the existing irrigation schemes

New water-supplying facilities at Pitap, Batang Alai, Amandit and Tapin can supplement irrigation water demand both in the wet and dry seasons for the existing irrigation schemes as below.

Water Source	Existing Irrigation Scheme	Wet Season (ha)	Dry Season (ha)
Pitap		3,734	3,734
	Suapin	267	343
	Lok Batu	291	367
	Sub-total	4,292	4,444
Batang Alai		6,223	6,223
	Intangan	260	743
	Kahakan	144	476
	Sub-total	6,627	7,442
Amandit		6,432	5,393
	Tayub	22	-
	Nunungin	129	-
	Kuangan	92	-
	Hawatu	185	-
	Taal	182	-
	Sub-total	7,042	5,393
Tapin		5,328	3,452
	Pampain	490	-
	Sub-total	5,818	3,452
Total	10 Existing Schemes	2,062	1,929

(3) Conversion of water sources of the existing schemes

New water-supplying facilities at Amandit and Tapin can function as new water sources of the existing irrigation schemes as follows.

Water Source	Existing Irrigation Scheme	Wet Season (ha)	Dry Season (ha)
Batang Alai		6,223	6,223
	Intangan	743	743
	Kahakan	476	476
	Sub-total	7,442	7,442
Amandit		6,432	5,393
	Tayub	200	-
	Nunungin	165	-
	Kuangan	235	-
	Hawatu	256	-
	Taal	289	-
	Sub-total	7,577	5,393
Tapin		5,328	3,452
	Pampain	882	-
	Labuhang	300	-
	Sub-total	6,510	3,452
Total	(Alternative Area)	3,546	1,219

(4) Maximum utilization of newly developed water sources

New water-supplying facilities at Amandit and Tapin have possibilities to transfer water to the existing irrigation schemes as below if a new conveyance canal is constructed.

Water Source	Existing Irrigation Scheme	Wet Season (ha)	Dry Season (ha)
Amandit		6,432	5,393
	Telaga Langsat	2,831	-
	Tayub	200	-
	Nunungin	165	-
	Kuangan	235	-
	Pamujaan	350	-
	Hawatu	256	-
	Taal	289	-
	Jarau	294	-
	Kayu Habang	347	-
	Sub-total	11,399	5,393
Tapin		5,328	3,452
	Lok Paikat	452	-
	Pampain	882	-
	Nupadang	253	-
	Pulau Pinang	270	-
	Rampanang	146	-
	Binuang	1,408	-
	Labuhang	300	-
	Sub-total	9,039	3,452
Total	(Alternative Area)	8,678	-

(5) Areas to be irrigated by the above newly identified water resources

Ten schemes out of 24 irrigation schemes can receive supplemental supply through available areas. Beside this measure, some alternative measures are considered for drainage schemes and existing irrigation schemes as discussed above. However, available areas within potential areas by new water sources are unable to utilize fully as shown in the below table, because paddy fields with higher elevations than irrigation water level of canals can not receive irrigation water by the gravity system.

As mentioned later in Chapter 8, evaluation of these alternative consideration are discussed based on the economic viability in Annex J, Project Evaluation.

Water Source	Available Area (ha)		Alternative Consideration	Alternative Area (ha)	
	Wet Season	Dry Season		Wet Season	Dry Season
Pitap	12,452	1,787	Drainage Scheme	-	785
			Supplemental Supply	558	710
			Sub-total	558	1,495
Batang Alai	12,065	2,471	Drainage Schemes	600	600
			Supplemental Supply	404	1,219
			Conversion	1,219	1,219
			Sub-total	1,819	1,819
Barabai	6,924	2,096	Drainage Schemes	800	800
			Sub-total	800	800
Amandit	10,552	0	Supplemental Supply	610	0
			Conversion	1,145	0
			Maximum	4,967	0
			Sub-total	4,967	0
Tapin	6,803	400	Drainage Schemes	400	400
			Supplemental Supply	490	-
			Conversion	1,182	-
			Maximum	3,711	-
			Sub-total	4,111	400
Total	48,796	6,754		12,255	4,514

4.3 Development Possibilities of New Irrigation Schemes with Dam Construction

(1) Background

Among available information on possibility of development of dams, the Report of National Water Power Resources Survey by PLN in 1983 is considered as the only data source based on systematic survey to find the places suited for waer power generation. In the Study Area, 13 places are proposed as shown in Figure 4.1. These sites were investigated for confirmation of informations under the present Study.

(2) Condition of damsites

The proposed damsites selected in the PLN's study are located in the northern and eastern parts of the Study Area. The investigation of sites by the on-the-spot survey reveals that limestone is widely distributed at such proposed damsites as Tabalong 1 on the Kumap river, Tabalong 2 on the Tabalong Kiwa river, Ayu 1 and 2 on the Ayu river, Ui site on the Tabalong Kanan river and Halong 1 and 2 on the Halong river. On the other hand, the proposed damsites on upper reaches of rivers in the eastern mountain areas consist entirely of diorite. This geological conditions make it possible to construct dams with high bodies. There are 5 proposed damsites in diorite areas. These are Pitap 1 and 2 on the Pitap river,

Batang Alai on the Batang Alai river, Amandit 1 on the Amandit river and Tapin on the Tapin river. However, it is estimated that effective storage capacities of these proposed dams are very small because of topographical limitations. Another damsite, Amandit 2 on the Amandit river, is situated in limestone areas.

(3) Benefited areas by dam construction

The prospective benefited areas of Pitap and Batang Alai damsites can be fully irrigated throughout the year by river discharges without dam construction as described in Section 4.2.2. There is no necessity to develop any dam on these rivers.

In Amandit and Tapin schemes, however, it is necessary to find water sources in order to enlarge irrigation areas in the dry season. From this viewpoint, construction of dam is taken into consideration and the following 3 options are examined.

Dam	Scheme	Option 1		Option 2		Option 3	
		Wet Season	Dry Season	Wet Season	Dry Season	Wet Season	Dry Season
Amandit	Amandit	6,432	6,432	6,432	6,432	6,432	6,432
	Existing irrigation	610	975	1,145	1,145	4,967	4,967
	Sub-total	7,042	7,407	7,577	7,577	11,399	11,399
Tapin	Tapin	5,328	5,328	5,328	5,328	5,328	5,328
	Existing drainage	400	400	400	400	400	400
	Existing irrigation	490	757	882	882	3,411	3,411
	Planned irrigation	-	-	300	300	300	300
	Sub-total	6,218	6,485	6,910	6,910	9,439	9,439

In case of Amandit dam, Option 1 is supplemental water supply to the alternative case as described in Section 4.2.2(1) and (2), Option 2 to the alternative case as described in Section 4.2.2(3), and Option 3 to the alternative case as described in Section 4.2.2(4).

As for Tapin dam, Option 1 is supplemental water supply to the alternative case as mentioned in Section 4.2.2(2), Option 2 to the alternative cases as mentioned in Section 4.2.2(1) and (3), and Option 4 to the alternative cases as mentioned in Section 4.2.2(1) and (4).

The following reveals preliminary comparison between required cost for dam construction as shown in Table 4.6 and prospective increase in the dry season irrigable areas.

(Unit: %)

Dam	Item	Weir Only	Option 1	Option 2	Option 3
Amandit	Cost	100	190	190	300
	Area	100	140	140	190
Tapin	Cost	100	260	280	350
	Area	100	170	180	250

From the above, it can be concluded that no merit is identified in terms of the additional investment for dam construction in the Study Area for the time being, because the increased ratios of costs in all cases are much higher than those of areas.

5. IMPROVEMENT OF EXISTING IRRIGATION SYSTEM

As described in Section 2.2, there exist 9 simple irrigation systems and 11 semi-technical irrigation systems in the Study Area. About 40% of the existing irrigation scheme areas has such problems that water supply is not sufficiently controlled.

5.1 Facilities

Effective utilization of limited river discharge cannot be achieved by simple or semi-technical irrigation method. Other than improvement of main intake facilities, it is necessary to improve canal systems and to take consistent measures in proper operation and management in order to make it possible to flow water to tertiary level for timely, uniform and efficient supply and distribution of water. These prerequisites are summarized as follows:

- 1) Diversion facilities with permanent conditions
- 2) Measurement facilities for water intake just below intake ports.
- 3) Structures which can measure and control flow in canal systems.
- 4) Tertiary networks to be thoroughly furnished in all schemes
- 5) Independent setting of irrigation and drainage canals on farm level.
- 6) Systematic and technical support systems for operation and maintenance.

In the Study Area, irrigable areas are usually distributed on a gentle slope. In such case, sufficient head is hardly secured between diversion facilities and inflow canals. It is therefore necessary to construct check gates for getting required head.

If the main system has a few diversion outlets and each tertiary unit of paddy fields covers a large area, diversion works operated by farmers in tertiary systems become complicated resulting in great losses and inefficient use of water. Moreover farmers with heavy responsibilities and payment obligations to distribute irrigation water at on-farm level are apt to give up their duties of management. In order to reduce farmers' responsibilities and

expenses, it is necessary to renew diversion facilities so that each tertiary unit of paddy fields covers an area of under 100 ha.

With the targeted improvement level of the above facilities, it will encourage farmers to form the required farmers organization.

5.2 Operation and Maintenance

Operation and maintenance is divided into such functions as operation of water control to intake, convey and divert water, and maintenance of facilities by inspection, improvement, repair and removal of obstacles to water supply.

5.2.1 Operation

(1) Headworks

The water management and control at headworks should be performed so that a diversion weir and an intake port can be functioned safely and rationally. A scouring sluice gate to remove sedimentation is operated on managing person's judgement. During the flood period, a scouring sluice gate functions as the flood sluice gate to let flood discharge flow. In an intake port, opening and closing of gate are controlled so as to secure necessary amount of intake water.

(2) Canals

Water management and control in canals should be performed so that diversion structures and check gates can be functioned safely and rationally. At a diversion structure, water-level, rate of flow and opening degree of gate are checked. At the same time, it shall be prohibited for farmers to operate or break facilities voluntarily for their purposes. At a check gate, water-level shall be watched for proper distribution.

In respect to canal management, it is important to ensure such facilities as headworks, canals and structures are always kept in good condition for securing proper and functional distribution. In principle, main systems should be well managed by the administration and tertiary systems should be well managed by irrigation associations or beneficial farmers.

5.2.2 Maintenance

In the existing irrigation schemes, most of the earth canals without periodical maintenance require to remove sedimentation which results in thick growth of waterweeds and loss of a designed cross-sectional area of flow.

Facility maintenance consists of 2 functions; regular facility maintenance and emergency facility maintenance.

- 1) Regular facility maintenance: A staff of management office should regularly inspect facilities and if he finds any damage, he should make a report to a management office. If damage is heavy, he should arrange a temporary repair as soon as possible. It is another his duty to make repair plan of canal structures periodically.
- 2) Emergency facility maintenance: Emergency facility maintenance should be performed when damage is heavy. A facility should be repaired at once by using materials obtained on site to avoid further extension of damage.

Main items of inspections and works for facility maintenance are as follows:

- 1) As damaged gates result in scour of embankments, a functioning of scouring sluice gates of headworks should be regularly inspected.
- 2) Weir bodies of headworks should be inspected whether cracks, pipings or peelings of surfaces occur or not.
- 3) Erosion of ripraps is considered to be inevitable. However, if ripraps are washed away, new ripraps should be constructed at once and if necessary the construction lengths should be extended. Without ripraps, pipings will occur and lowering of the foreaprons will be resulted.
- 4) Sediment, waterweeds and suspended solids should be removed.
- 5) Freeboards of canals should be cleaned.
- 6) Trees and plants growing at joints in masonry works should be removed.
- 7) Sediment on gate sills of diversion structures and turnouts should be removed.
- 8) Joints between earth canals and masonry works should be checked.
- 9) Gates, safety bars and handrails should be regularly coated.
- 10) Full opening and full closing of gates should be checked and parts of gates should be lubricated.
- 11) Stoplogs for gates should be reserved.

As a part of the management system, management offices should be established under each Kabupaten office. Each management office consisting of a inspector, overseers and gate keepers is recommended to have jurisdiction over an area of about 1,000 ha with several schemes.

The main works of management offices are summarized as follows:

- 1) Formulation of irrigation schedule
- 2) Collection and analysis of data
- 3) Water supply control and canal system management
- 4) Guidance in technique for irrigation associations and benefiting farmers
- 5) General affairs and accountancy

6. IRRIGATION DEVELOPMENT PLAN

6.1 Kabupaten Tabalong

(1) Existing schemes

There are 3 ongoing schemes in Kabupaten Tabalong. The outline of upgrading plan for these schemes is shown below. Table 6.1 gives a summary of work items and quantities by scheme.

Scheme	Scheme Area (ha)	Upgrading of System		Early Completion of Main System (ha)	Tertiary System Development (ha)
		Existing	Target		
1. Jaro	625	T	T	-	-
2. Jaro Bawah	200	S	T	200	200
3. Gumba	254	S	T	-	254
Total	1,079			200	454

Remarks: T; Technical irrigation
ST; Semi-technical irrigation
S; Simple irrigation

As the headworks of Jaro Bawah scheme constructed in 1981 have already collapsed, it is impossible to intake water. New headworks will have intake ports on the both banks. Thus water drawn through the headworks will irrigate the new Sungai Kati scheme located on the opposite bank of the Jaro Bawah scheme. The construction of canal facilities has been left to farmers. At present, these canal facilities are not functioning so that full-scale renewal of these facilities is necessary.

In the Gumba scheme, the main system was completed but tertiary system have not been introduced.

(2) New schemes

There are 7 schemes newly identified in Kabupaten Tabalong. The outline of irrigation development target is described below. Table 6.2 presents a summary of work items and quantities.

Scheme	Scheme Area (ha)	Irrigation Area (ha)	
		Wet Season	Dry Season
31. Sungai Kati	280	280	42
32. Namun	64	64	22
33. Kinarum	408	408	408
34. Mihim	203	203	203
35. Batupulut	225	225	162
36. Bilas	643	643	643
37. Banju Tajun	750	750	750
Total	2,573	2,573	2,230

The Sungai Kati scheme will be irrigated by the headworks of the existing Jaro Bawah scheme.

In the Namun scheme, if headworks are constructed at the place selected by DPUP South Kalimantan, water cannot flow into some portion of paddy fields with a little higher elevation. If headworks are constructed about 300 m upstream from DPUP's selected place and canals are constructed along hills, it is possible to lead the water flow into all paddy fields.

In the Mihim scheme, water will be drawn through headworks on the left bank and a diversion structure will be constructed below the headworks so as to irrigate both the Mihim and Batupulut schemes. Flood embankment is not needed on the proposed headworks site.

In the Bilas scheme, the river makes a sweep to the left just below the DPUP's selected headworks site. So, headworks will have to be constructed about 35 m upstream from the DPUP's site from the engineering viewpoint. The headworks will have intake ports on the both banks as the irrigation command area of this scheme extends on both banks. Flood embankments, which may be long, will have to be constructed on the both banks because the whole area around the river is flat.

6.2 Kabupaten Hulu Sungai Utara

(1) Existing schemes

There are 4 ongoing schemes in Kabupaten Hulu Sungai Utara. The outline of upgrading plan for these schemes is shown below. Table 6.1 presents a summary of work items and quantities by scheme.

Scheme	Scheme Area (ha)	Upgrading of System		Early Completion of Main System (ha)	Tertiary System Development (ha)	
		Existing	Target		Target	Further Extension
4. Paran	188	ST	T	64	188	
5. Tindakan	233	ST	T	-	233	
6. Suapin	116	ST	T	-	116	267
7. Lok Batu	116	ST	T	-	116	291
Total	653			64	653	558

In the Paran scheme, the main system on the right bank with an area of 64 ha is not constructed, while the main system on the left bank with an area of 124 ha was completed. On the left bank, however, the head reach canal is so defective that intake water is apt to overtop beyond a crest of canal resulting that the design discharge cannot be conveyed. It is necessary to consider measures for improvement of the left bank canal, construction of a main system on the right bank, and tertiary and drainage systems for irrigation areas on the both banks. For the Suapin and Lok Batu schemes, further extension of tertiary systems is required when the Pitap irrigation scheme to be newly developed starts to supply irrigation water to these schemes.

(2) New schemes

There are 2 schemes newly identified in Kabupaten Hulu Sungai Utara. The outline of irrigation development target is described below. Table 6.2 presents a summary of work items and quantities.

Scheme	Scheme Area (ha)	Irrigation Area (ha)		Additional Water Supply
		Wet Season	Dry Season	
38. Balangan	2,172	2,172	2,172	
39. Pitap	3,734	3,734	3,734	Batu Mandi drainage scheme (785 ha for dry season) and Suapin/Lok Bat irrigation schemes (558 ha for wet season and 710 ha for dry season)
Total	5,906	5,906	5,906	

In the Balangan scheme, the headworks with intake port on the left bank will have to be constructed around the bridge at Tabuan Village below the confluence of the Balangan and Tabuan rivers. A canal will have to be constructed from the headworks through Malunjuk Village and from there along hills. Rain-fed paddy fields around Juai and Muaraninian should be irrigated by this canal. Secondary canals will have to be constructed along 2 hills

extending to the west from the above hills so that the water can be supplied to the above rain-fed paddy fields.

In the Pitap scheme, the headworks with the intake ports on the both banks will have to be constructed on the Pitap river about 1.2 km above the Bihara Village. The irrigation command area on the right bank is the rain-fed paddy fields surrounded by the Pitap River, the Sikuntan River and the road running to Badalungga village and Sikuntan village. The irrigation command area on the left bank is the rain-fed paddy fields around Awayan Village, the rain-fed paddy fields along the road running from Lok Batu to Batumandi Villages and the lower rain-fed paddy fields around Paringin on the left bank of the Balangan river. The canal to send water to areas around Paringin will have to be aligned along the Munjung River economically because of the longer main canal on the left bank.

For supplying the dry season irrigation water to the existing Batu Mandi drainage scheme as of 785 ha described in Section 4.2.2(1), the feeder canal which is branched off at Batu Mandi Village from the main canal is required to be constructed along the national road.

With regard to alternative considerations on irrigation water supply from the new Pitap scheme to the existing Suapin and Lok Batu irrigation schemes as described in Section 4.2.2(2) and (3), the diversion structure is required at Bihara Village. Supply canals conveying the water from the diversion structure to these existing schemes are also required to be constructed.

6.3 Kabupaten Hulu Sungai Tengah

(1) Existing schemes

There are 8 ongoing schemes in Kabupaten Hulu Sungai Tengah. The outline of upgrading plan for these schemes is shown below. Table 6.1 indicates a summary of work items and quantities by scheme.

Scheme	Scheme Area (ha)	Upgrading of System		Early Completion of Main System (ha)	Tertiary System Development (ha)	
		Existing	Target		Target	Further Extension
8. Talang	165	S	T	-	165	-
9. Tapuk	186	S	T	-	186	-
10. Tamiyang	166	S	T	-	166	-
11. Baruh Hawang	160	S	T	47	160	-
12. Intangan	920	T	T	-	920	260
13. Kahakan	633	T	T	-	633	144
14. Mangunang	515	ST	T	-	515	-
15. Haruyang Dayak	1,486	T	T	-	1,486	-
Total	4,231			47	4,231	404

In the Talang scheme, canals are not functioning well because of inflow of sediment from their vicinity. Moreover, in some places, earth canals run over grounds with high permeability, where leakage occurs and canals are not functioning. The lining of canals is needed.

In the Baruh Hawang scheme, it is necessary to review the slope of canal just below the intake port of the main canal on the left bank.

In the Intangan scheme, as mentioned in Section 2.4 (3), the forepron below the headworks is being damaged. Therefore, early repair and riprap works will be needed. Some places of tertiary canals are not functioning because cross-sections have been reduced by sedimentation.

For supplying the year-round irrigation water to the existing drainage schemes, new feeder canals are required to be constructed from the new Batang Alai and Barabai irrigation schemes to the existing Tg. Semanggi Kambat and Tg. Jaranih drainage schemes, respectively.

After the Batang Alai irrigation scheme is constructed, a supplemental or alternative water supply source can be considered to the existing Intangan and Kahakan irrigation schemes. In these cases, further extension of tertiary system is required.

(2) New schemes

There are 2 schemes newly identified in Kabupaten Hulu Sungai Tengah. The outline of irrigation development target is described below. Table 6.2 gives a summary of work items and quantities.

Scheme	Scheme Area (ha)	Irrigation Area (ha)		Additional Water Supply
		Wet Season	Dry Season	
40. Batang Alai	6,223	6,223	6,223	Tg. Semanggi Kambat drainage scheme (600 ha for both seasons) and Intangan/Kahakan irrigation schemes (404 ha for wet season and 1,219 ha for dry season in case of supplemental water supply; 1,219 ha for both seasons in case of water source conversion).
41. Barabai	2,278	2,278	2,278	Tg. Jaranih drainage scheme (800 ha for both seasons).
Total	8,501	8,501	8,501	

In the Batang Alai scheme, the headworks with intake port on the left bank of the Batang Alai river are required to be constructed at Batu Kijang. The main canal is required to be constructed along hills from there to Pematang where a diversion structure will have to be

constructed so as to divide water into the left-bank and right-bank irrigation command areas. An aqueduct is needed to be constructed between Pematang and Labuhan in order to convey water to the right-bank command area surrounded by the Baruh Hawang irrigation scheme, and the Batang Alai and Tabang rivers. The left-bank command area is surrounded by the Intangan and Kahakan irrigation schemes, the swamp area, and the Batang Alai and Barabai rivers. The existing Tg. Semanggi Kambat drainage scheme is located adjacent to the left-bank irrigation command area.

In the Barabai scheme, the headworks with intake port on the left bank will have to be constructed at Hantakan Village. The main canal is needed to be constructed along the mountains to Pagat where water will have to be conveyed to the irrigation command area surrounded by Mangunang scheme and, the Barabai and Labuana rivers. The existing Tg. Jaranih drainage scheme is located adjacent to the proposed Barabai irrigation scheme.

6.4 Kabupaten Hulu Sungai Selatan

(1) Existing schemes

There are 8 ongoing schemes in Kabupaten Hulu Sungai Selatan. The outline of irrigation upgrading target is described below. Table 6.1 presents a summary of work items and quantities scheme.

Scheme	Scheme Area (ha)	Upgrading of System		Early Completion of Main System (ha)	Tertiary System Development (ha)	
		Existing	Target		Target	Further Extension
16. Telaga Langsat	1,534	T	T	-	1,534	-
17. Tayub	178	ST	T	-	178	22
18. Nunungin	36	S	T	-	36	129
19. Kuangan	143	ST	T	-	143	92
20. Pamujaan	214	S	T	-	214	-
21. Hawatu	71	S	T	71	71	185**
22. Taal	107	ST	T	-	107	182
23. Jarau	143	T	T	-	143*	-
Total	2,426			71	2,426	610

Remarks: *; Drain system only **: Including main system

In the Nunungin and Hawatu schemes, it is necessary to construct the headworks and renew all facilities. Problems at other schemes lie in lack of facility management. Early rehabilitation of main system and introduction of tertiary facilities will be needed.

In respect to alternative considerations on irrigation water supply from the new Amandit scheme to the existing Tayub, Nunungin, Kuangan, Hawatu and Taal irrigation schemes as described in Section 4.2.2(2) and (3), further extension of tertiary system is required in these 5 schemes and the Hawatu scheme needs additional extension of main system.

(2) New schemes

There are 2 schemes newly identified in Kabupaten Hulu Sungai Selatan. The outline of irrigation development target is described below. Table 6.2 presents a summary of work items and quantities.

Scheme	Scheme Area (ha)	Irrigation Area (ha)		Additional Water Supply
		Wet Season	Dry Season	
42. Kayu Habang	347	347	147	
43. Amandit	6,432	6,432	5,393	Tayub/Nunungin/Kuangan/Hawatu/Taal irrigation schemes (610 ha for wet season in case of supplemental water supply; 1,145 ha for wet season in case of water source conversion), and Telaga Langsung/Tayub/Nunungin/Kuangan/Pamujaa/Hawatu/Taal/Jarau/Kayu Habang irrigation schemes (4,967 ha for wet season in case of maximum utilization of water source).
Total	6,779	6,779	5,540	

In the Kayu Habang scheme, the irrigation command area is the lowland to the west of Angkinang along the national road running from Kandangan to Barabai. The headworks with intake port on the right bank will have to be constructed around Tabat Lama on the Kayu Habang river. The canals are needed to be constructed from there to the high land extending to the north.

In the Amandit scheme, the headworks with intake ports on both the banks will have to be constructed at Jelatang in upper reaches of the Amandit river. The irrigation command area covers a large area: its northern end is around Angkinang and its southern end at Taal and its lower end borders on the swamp area. The right-bank irrigation command area includes the existing Tayub, Nunungin and Kuangan irrigation schemes. The left-bank irrigation command area includes the existing Hawatu and Taal irrigation schemes. These irrigation schemes are on the foot of the hills running north to south to the east of Amandit main scheme. In order to supply water to the existing new irrigation schemes, the main canal will have to be constructed along the hills. As for the water supply to the Taal irrigation scheme, a supply canal with a length of 600 m is required to be constructed from the end of the main canal along a national road. Due to limited water resources of the Amandit river, such alternative considerations on supplemental water supply and water source conversion are possible only for the wet season as described in Section 4.2.2.

6.5 Kabupaten Tapin

(1) Existing schemes

There are seven ongoing schemes in Kabupaten Tabalong. The outline of upgrading plan for these schemes is shown below. Table 6.1 indicates a summary of work items and quantities by scheme.

Scheme	Scheme Area (ha)	Upgrading of System		Early Completion of Main System (ha)	Tertiary System Development (ha)	
		Existing	Target		Target	Further Extension
24. Lok Paikat	392	T	T	-	392	-
25. Pampain	392	ST	T	-	392	490
26. Nupadang	253	T	T	-	253	-
27. Tatakan	99	ST	T	-	99	-
28. Pulau Pinang	270	ST	T	-	270	-
29. Rampanang	146	T	T	-	146	-
30. Binuang	1,106	T	T	-	1,106	-
Total	2,658			-	2,658	490

In the Pampain scheme, as mentioned in Section 2.4(5), a place near the intake port of the canal was damaged by seepage water and a gate remains closed. Thus it is impossible to cultivate the irrigation command area for the dry season. Such damages of the main facility affect a tertiary system, so that early countermeasures will have to be taken. When irrigation water is supplemented from the new Tapin scheme, further extension of tertiary development is required.

In the Binuang scheme, early countermeasures are needed to be carried out because a place near the intake port of the main facility is defective. For this purpose, the application of masonry lining with trapezoidal cross-sections is required to prevent side wall from crumbling in some place of an earth canal.

(2) New schemes

There are 2 schemes newly identified by the Study Team and planned by DPUP South Kalimantan in Kabupaten Tapin. The outline of irrigation development target is described below. Table 6.2 gives a summary of work items and quantities.

Scheme	Scheme Area (ha)	Irrigation Area (ha)		Additional Water Supply
		Wet Season	Dry Season	
44. Tapin	5,328	5,328	3,452	5bh Pintu Air drainage scheme (400 ha for both seasons), Pampain irrigation scheme (490 ha for wet season in case of supplemental water supply), Pampain/Labuhang irrigation schemes (1,182 ha for wet season in case of water source conversion), and Lok Paikat/Pampain/Nupadang/Pulau Pinang/Rampanang/Binuang/Labuhang irrigation schemes (3,711 ha for wet season in case of maximum utilization of water source).
45. Labuhang	300	300	159	
Total	5,628	5,628	3,611	

In the Tapin scheme, the headworks with intake port on the right bank are required to be constructed at Rantaubujur on the upper reaches of the Tapin river. The irrigation command area extends on both the banks: its north end is a Lok Paikat, its south end at Tatakan and the lower end borders on the swamp area. Water will have to be drawn on the right bank, and the main canals to be divided at the diversion structure will have to be constructed along hills running to the east of the irrigation command area on the both banks. In this scheme, the construction of headworks began in 1984/1985 but have been suspended because of shortage of funds in the final stage of construction. Early resumption of the construction works is desired. Judging from the topography, however, the huge volume for flood embankment is required.

In the Labuhang scheme located within the right-bank irrigation command area of the new Tapin scheme, the headworks will have to be constructed on the Randa river so that the neighboring rain-fed paddy fields with an area of 300 ha can be irrigated.

For alternative considerations on water supply from the Tapin scheme, it is required to construct conveyance canal with design capacities according to the scale of additional irrigation areas.

7. COST ESTIMATES

Necessary cost for upgrading and development works for each irrigation scheme is calculated on the basis of following conditions.

- 1) Unit prices are based on Engineer's estimate used in the bid for Riam Kanan Project in 1988 as listed up in Table 7.1.
- 2) The above unit prices are increased by 20% in consideration of the transportation distances between construction material supply sites and scheme areas.

- 3) Costs of miscellaneous works of 10%, general items of 15% and value added tax of 10% are taken into consideration.
- 4) As to land acquisition, Rp.500/m² is considered for irrigation and drainage systems and Rp.400/m² is considered for damsites. But land acquisition for tertiary systems is excluded from the consideration.

Tables 7.2 and 7.3 show costs required for upgrading of the existing schemes and development of the new schemes, respectively. As for alternative considerations from the newly developed water sources, additional costs required are summarized in Table 7.4.

8. IMPLEMENTATION PROGRAM

From the viewpoint of irrigation engineering, upgrading plans are made for the existing 30 schemes and development plans are formulated for 15 planned and new schemes as shown in Figure 8.1. Based on the preliminary estimates of cost and benefit, economic viability of each of these 45 schemes is evaluated as described in Annex J, Project Evaluation. According to the result of economic evaluation, 15 each of upgrading and new development plans are evaluated as the proposed irrigation schemes in the Study Area, while the remaining 15 upgrading plans are dropped out due to their low economic viability. In respect to alternative water supply plans, the result of economic evaluation reveals that the water supply plan from the Barabai irrigation scheme to the Tg. Jaranih drainage scheme is more economical than each of individual plans of these schemes. On the contrary, all of other alternative water supply plans show the receding tendency in their economic feasibility compared with those of new irrigation schemes themselves. Table 8.1 shows a list of irrigation schemes either evaluated or dropped out.

The implementation program for the 30 schemes evaluated is formulated paying special attention to availability of investment fund as described in Annex J, Project Evaluation.

The following is recommendable action programs for the 15 schemes dropped out through the economic evaluation.

- 1) In Kabupaten Tabalong, the Jaro scheme of 625 ha will require Rp. 8 million for rehabilitation works. It is recommendable to carry out these works as a part of operation and maintenance activities.
- 2) In Kabupaten Hulu Sungai Utara, the Lok Batu scheme of 116 ha has difficulty to maintain the main canal due to its topographic condition. If continuation of this scheme is indispensable from the social viewpoint, it is recommendable to supply irrigation water from the new Pitap scheme.
- 3) In Kabupaten Hulu Sungai Tengah, there is no merit to make investment for tertiary system development in such schemes as Intangan of 920 ha, Kahakan of 633 ha and Haruyang Dayak of 1,486 ha. Taking into account the present

condition of facilities, it is recommendable to make maintenance works intensive by getting extra fund. Rehabilitation and renewal costs required are estimated to be Rp. 88 million for the Intangan scheme, Rp. 125 million for the Kahakan scheme and Rp. 162 million for the Haruyang Dayak scheme.

- 4) In Kabupaten Hulu Sungai Selatan, the same action for the above case of Kabupaten Hulu Sungai Tengah is recommendable for the Telaga Langaat scheme of 1,534 ha. A fairly large amount of investment is required for upgrading such small scale schemes as Nunungin of 36 ha, Kuangan of 143 ha, Hawatu of 71 ha and Taal of 107 ha. If farmers in these schemes intend to make their paddy fields much better it is recommendable to consider supplemental water supply for the wet season paddy cultivation from the new Amandit scheme. The Jarau scheme requires costs of Rp. 14 million for rehabilitation and renewal of structures. As beneficial farmers in this scheme are eager to continue their farming, it is recommendable to strengthen the operation and maintenance work of the existing facilities covering improvement works of the canal networks.
- 5) In Kabupaten Tapin, it is recommendable to improve sedimentation problem of adjacent rivers presently causing inadequate operation of such schemes as Lok Paikat of 392 ha and Binuang of 1,106 ha. Required rehabilitation and renewal costs for the Rampanang scheme of 146 ha are estimated to be Rp. 31 million so that it is recommendable to conduct these works as a part of operation and maintenance work. On the other hand, it is recommendable to keep the Nupadang scheme as it is due to its remote location.

9. RECOMMENDATION

- 1) Under the present Study, the headworks sites and irrigation command area of new schemes are selected on the basis of the topographical map with a scale of 1/50,000 and contour intervals of 25 m. Therefore, the design headwater levels at intake points and the accurate elevations of irrigation command areas will have to be confirmed when the water conveyance plan by gravity irrigation method is formulated. Prior to execution of works in future, the setting of bench marks is required.
- 2) There are many command areas to be irrigated by canals with small gradient. If fish ponds are constructed near such canals, it is very difficult for the water to flow back to canals from inlets of fish ponds. Pond owners are apt to consider running water condition as prerequisite to breed fish. Such condition makes intake water impossible to use for the irrigation purpose. Establishment of proper allocation and management rules of water sources is indispensable in carrying out new irrigation development schemes.

- 3) In order to establish water management organization by farmers and to make the organization function well, it is recommendable to get proper coordination and cooperation by other provincial institutions concerned than DPUP South Kalimantan.

TABLES

Table 2.1 Inventory of Existing Irrigation Schemes

(Unit:ha)

Kabupaten & Scheme	Level of Irrigation System	Irrigated Paddy Field	Rain-fed Paddy Field Annually Used	Rainfed Paddy Field Occasionally Used	D.P.U.P's Plan		Source of Water	Catchment Area (km ²)
					Original	Revised		
Tabalong								
1. Jaro	T	625	0	0	625		S.Jaro	10
2. Jaro Bawah	S	200	0	0	200		S.Jaro	11
3. Gumba	S	0	15	239	254		S.Gumba	17
Sub-Total		825	15	239	1,079	1,079		
Hulu Sungai Utara								
4. Paran	ST	0	120	68	188		S.Paran	19
5. Tundakan	ST	182	0	86	268		S.Tundakan	4
6. Suapin	ST	317	36	30	383		S.Meraup	2
7. Lok Batu	ST	105	260	42	407		S.Lok Batu	2
Sub-Total		604	416	226	1,246	1,246		
Hulu Sungai Tengah								
8. Telang	S	42	252	75	369	165	S.Talang	5
9. Tapuk	S	78	59	49	186	186	S.Tapuk	8
10. Tamiyang	S	146	120	54	320	166	S.Tamiyang	6
11. Baruh Hawang	S	89	71	45	205	160	S.Hawang	7
12. Intangan	T	587	808	134	1,529	1,180	S.Intangan	16
13. Kahakan	T	755	0	22	777	777	S.Kahakan	11
14. Mangunang	ST	503	303	20	826	515	S.Hapulang	20
15. Haruyan Dayak	T	764	600	122	1,486	1,486	S.Haruyan	75
Sub-Total		2,964	2,213	521	5,698	4,635		
Hulu Sungai Selatan								
16. Telaga Langsat	T	2,410	369	52	2,831		S.Angkinang	43
17. Tayub	ST	200	0	0	200		S.Tayub	5
18. Nunungin	S	105	60	0	165		S.Nunungin	1
19. Kuangan	ST	185	50	0	235		S.Kuangan	4
20. Pamujan	S	310	40	0	350		S.Pamujan	6
21. Hawatu	S	150	106	0	256		S.Hawatu	2
22. Taal	ST	245	0	44	289		S.Taal	3
23. Jarau	T	233	5	56	294		S.Jarau	4
Sub-Total		3,838	630	152	4,620	4,620		
Tapin								
24. Lok Paikat	T	209	142	101	452		S.Lok Paikat	11
25. Pampain	ST	300	42	540	882		S.Pampain	11
26. Nupadang	T	50	150	53	253		S.Nupadang	8
27. Tatakai	ST	85	13	1	99		S.Tatakai	3
28. Pulau Pinang	ST	220	42	8	270		S.Pulau Pinang	9
29. Rampanang	T	136	9	1	146		S.Rampanang	12
30. Binuang	T	420	233	755	1,408		S.Binuang	31
Sub-Total		1,420	631	1,459	3,510	3,510		
Total		9,651	3,905	2,597	16,153	15,090		

Remarks: T : Technical
ST : Semi-Technical
S : Simple

Source: D.P.U.P Kabupaten Offices

Table 3.1 Calculation of Diversion Water Requirements

Wet Season (1979)		Nov			Dec			Jan			Feb			Mar		
		L	R	M	L	R	M	L	R	M	L	R	M	L		
(1) 10-day Consumption	(mm)	-	30	32	37	35	36	43	46	48	38	47	43	47		
(2) Effective rainfall	(mm)	-	30	23	37	35	34	25	45	48	11	8	43	47		
(3) Net demand (1)-(2)	(mm)	-	0	9	0	0	2	18	1	0	27	39	0	0		
(4) Crop intensity		-	1/12	3/12	5/12	7/12	9/12	11/12	1	1	1	1	11/12	9/12		
(5) Puddling water	(mm)	10	20	20	20	20	20	10	-	-	-	-	-	-		
(6) Nursery water	(mm)	2	2	2	2	2	2	1	-	-	-	-	-	-		
(7) Net irr. req. (3)x(4)+(5)+(6)	(mm)	12	22	24	22	22	24	28	1	0	27	39	0	0		
(8) Diversion req. (7)/0.68	(mm)	17.6	32.4	35.3	32.4	32.4	35.3	41.2	1.5	0	39.7	57.4	0	0		
(9) - do - (8)/86.4 or 95.04	(l/sec/ha)	0.20	0.38	0.41	0.34	0.38	0.41	0.43	0.02	0	0.57	0.66	0	0		
(10) Average div. req	(l/sec/ha)	0.20		0.38			0.41			0.17			0.22			

Dry Season (1976)		May			Jun			Jul			Aug			Sep		
		L	R	M	L	R	M	L	R	M	L	R	M	L		
(1) 10-day Consumption	(mm)	-	42	44	47	51	55	65	76	75	71	59	52	44		
(2) Effective rainfall	(mm)	0	42	35	33	35	0	0	33	0	28	0	0	7		
(3) Net demand (1)-(2)	(mm)	-	0	9	14	16	55	65	43	75	43	59	52	37		
(4) Crop intensity		-	1/8	3/8	5/8	7/8	1	1	1	1	7/8	5/8	3/8	1/8		
(5) Puddling water	(mm)	15	30	30	30	15	-	-	-	-	-	-	-	-		
(6) Nursery water	(mm)	3	3	3	3	1	-	-	-	-	-	-	-	-		
(7) Net irr. req. (3)x(4)+(5)+(6)	(mm)	18	33	36	42	30	55	65	43	75	38	37	20	5		
(8) Diversion req. (7)/0.68	(mm)	26.5	48.5	52.9	61.8	44.1	80.9	95.6	63.2	110.3	55.9	54.4	29.4	7.4		
(9) - do - (8)/86.4 or 95.04	(l/sec/ha)	0.28	0.56	0.61	0.72	0.51	0.94	1.01	0.73	1.28	0.59	0.63	0.34	0.09		
(10) Average div. req	(l/sec/ha)	0.28		0.63			0.83			0.86			0.35			

Table 4.1 Water Availability at Intake Sites of Existing Irrigation Schemes

Kabupaten & Scheme	Catchment Area(km ²)	River Discharge (m ³ /sec)					
		Jan	Feb	Mar	Apr	May	Jun
Tabalong							
1.Jaro	10	0.44	0.42	0.42	0.36	0.29	0.22
2.Jaro Bawah	11	0.48	0.46	0.46	0.40	0.32	0.24
3.Gumba	17	0.79	0.76	0.78	0.69	0.52	0.40
H.S.U							
4.Paran	19	0.69	0.68	0.57	0.44	0.42	0.39
5.Tundakan	4	0.15	0.14	0.12	0.09	0.09	0.08
6.Suapin	2	0.07	0.07	0.06	0.05	0.04	0.04
7.Lok Batu	2	0.07	0.07	0.06	0.05	0.04	0.04
H.S.T							
8.Talang	5	0.21	0.22	0.22	0.21	0.18	0.14
9.Tapak	8	0.34	0.36	0.36	0.33	0.28	0.23
10.Tamiyang	6	0.26	0.27	0.27	0.25	0.21	0.17
11.Baruh Hawang	7	0.30	0.31	0.31	0.29	0.25	0.20
12.Intangan	16	0.68	0.72	0.71	0.66	0.57	0.46
13.Kahakan	11	0.47	0.49	0.49	0.46	0.39	0.31
14.Mangunang	20	0.86	0.90	0.89	0.83	0.71	0.57
15.Haruyan Dayak	75	3.21	3.36	3.35	3.11	2.67	2.14
H.S.S							
16.Telaga Langsat	43	1.43	1.36	1.53	1.20	0.91	0.63
17.Tayub	5	0.17	0.16	0.18	0.14	0.11	0.07
18.Nunungin	1	0.03	0.03	0.04	0.03	0.02	0.01
19.Kuangan	4	0.13	0.13	0.14	0.11	0.08	0.06
20.Pamujaan	6	0.20	0.19	0.21	0.17	0.13	0.09
21.Hawatu	2	0.07	0.06	0.07	0.06	0.04	0.03
22.Taal	3	0.10	0.09	0.11	0.08	0.06	0.04
23.Jarau	4	0.13	0.13	0.14	0.11	0.08	0.06
Tapin							
24.Lok Paikat	11	0.37	0.35	0.39	0.31	0.23	0.16
25.Pampain	11	0.37	0.35	0.39	0.31	0.23	0.16
26.Nupadang	8	0.27	0.25	0.28	0.22	0.17	0.12
27.Tatakan	3	0.10	0.09	0.11	0.08	0.06	0.04
28.Pulau Pinang	9	0.30	0.28	0.32	0.25	0.19	0.13
29.Rampanang	12	0.40	0.38	0.43	0.34	0.25	0.18
30.Binuang	31	1.03	0.98	1.10	0.87	0.66	0.46

Kabupaten & Scheme	Catchment Area(km ²)	River Discharge (m ³ /sec)					
		Jul	Aug	Sep	Oct	Nov	Dec
Tabalong							
1.Jaro	10	0.19	0.17	0.15	0.17	0.24	0.40
2.Jaro Bawah	11	0.21	0.18	0.17	0.19	0.27	0.44
3.Gumba	17	0.33	0.29	0.29	0.32	0.47	0.79
H.S.U							
4.Paran	19	0.32	0.26	0.26	0.26	0.42	0.62
5.Tundakan	4	0.07	0.06	0.05	0.06	0.09	0.13
6.Suapin	2	0.03	0.03	0.03	0.03	0.04	0.07
7.Lok Batu	2	0.03	0.03	0.03	0.03	0.04	0.07
H.S.T							
8.Talang	5	0.12	0.09	0.08	0.07	0.11	0.18
9.Tapak	8	0.19	0.15	0.12	0.12	0.17	0.29
10.Tamiyang	6	0.14	0.11	0.09	0.09	0.13	0.22
11.Baruh Hawang	7	0.16	0.13	0.11	0.10	0.15	0.25
12.Intangan	16	0.38	0.29	0.24	0.24	0.35	0.57
13.Kahakan	11	0.26	0.20	0.17	0.16	0.24	0.40
14.Mangunang	20	0.47	0.36	0.30	0.29	0.44	0.72
15.Haruyan Dayak	75	1.76	1.37	1.13	1.10	1.64	2.69
H.S.S							
16.Telaga Langsat	43	0.42	0.32	0.30	0.37	0.58	1.05
17.Tayub	5	0.05	0.04	0.04	0.04	0.07	0.17
18.Nunungin	1	0.01	0.01	0.01	0.01	0.01	0.02
19.Kuangan	4	0.04	0.03	0.03	0.03	0.05	0.10
20.Pamujaan	6	0.06	0.04	0.04	0.05	0.08	0.15
21.Hawatu	2	0.02	0.01	0.01	0.02	0.03	0.05
22.Taal	3	0.03	0.02	0.02	0.03	0.04	0.07
23.Jarau	4	0.04	0.03	0.03	0.03	0.05	0.10
Tapin							
24.Lok Paikat	11	0.11	0.08	0.08	0.09	0.15	0.27
25.Pampain	11	0.11	0.08	0.08	0.09	0.15	0.27
26.Nupadang	8	0.08	0.06	0.06	0.07	0.11	0.20
27.Tatakan	3	0.03	0.02	0.02	0.03	0.04	0.07
28.Pulau Pinang	9	0.09	0.07	0.06	0.08	0.12	0.22
29.Rampanang	12	0.12	0.09	0.08	0.10	0.16	0.29
30.Binuang	31	0.30	0.23	0.22	0.26	0.42	0.76

Table 4.2 Re-estimated Irrigable Area of Existing Irrigation Schemes

(Unit:ha)

Kabupaten & Scheme	Data obtained from Revised Plan	DPU Kabupaten Office		Potential Irrigable Area based on Water Availability		Re-estimated Irrigable Area		Area not to be Irrigated by Available Water	
		Wet Season	Dry Season	Wet Season	Dry Season	Wet Season	Dry Season	Wet Season	Dry Season
Tabalong									
1. Jaro	625	625	436	642	220	625	220	0	405
2. Jaro Bawah	200	200	0	700	242	200	200	0	0
3. Gumba	254	0	0	1,247	388	254	254	0	0
Sub-Total	1,079	825	436	2,589	850	1,079	674	0	405
H.S.U									
4. Paran	188	0	-	1,106	377	188	188	0	0
5. Tundakan	268	182	71	233	79	233	79	35	189
6. Suapin	383	317	37	116	40	116	40	267	343
7. Lok Batu	407	105	25	116	40	116	40	291	367
Sub-Total	1,246	604	133	1,571	536	653	347	593	899
H.S.T									
8. Talang	165	42	2	288	137	165	137	0	28
9. Tapuk	186	78	25	460	219	186	186	0	0
10. Tamiyan	166	146	7	345	164	166	164	0	2
11. Baruh	160	89	17	403	191	160	160	0	0
Hawang									
12. Intangan	1,180	587	10	920	437	920	437	260	743
13. Kabukan	777	755	413	633	301	633	301	144	476
14. Mangunan	515	503	271	1,150	547	515	515	0	0
15. Ilanyan	1,486	764	210	4,313	2,051	1,486	1,486	0	0
Dayak									
Sub-Total	4,635	2,964	955	8,512	4,047	4,231	3,386	404	1,249
H.S.S									
16. Telaga Langsat	2,831	2,410	1,000	1,534	487	1,534	487	1,297	2,344
17. Tayub	200	200	0	178	57	178	57	22	143
18. Nunungin	165	105	0	36	11	36	11	129	154
19. Kuangan	235	185	0	143	45	143	45	92	190
20. Pamujaan	350	310	0	214	68	214	68	136	282
21. Hawatu	256	150	0	71	23	71	23	185	233
22. Taal	289	245	0	107	34	107	34	182	255
23. Jarau	294	233	50	143	45	143	45	151	249
Sub-Total	4,620	3,838	1,050	2,426	770	2,426	770	2,194	3,850
Tapin									
24. Lok Paikat	452	209	0	392	125	392	125	60	327
25. Pampain	882	300	65	392	125	392	125	490	757
26. Nupadang	253	50	0	285	91	253	91	0	162
27. Tatakan	99	85	20	107	34	99	34	0	65
28. Pulau Pinang	270	220	70	321	102	270	102	0	168
29. Rampanang	146	136	20	428	136	146	136	0	10
30. Binuang	1,408	420	-	1,106	351	1,106	351	302	1,057
Sub-Total	3,510	1,420	175	3,031	964	2,658	964	852	2,546
Total	15,090	9,651	2,749	18,129	7,167	11,047	6,141	4,043	8,949

Remarks: Data based on DPUP Kabupaten Offices

Table 4.3 Inventory of Planned and New Irrigation Schemes

Kabupaten & Hydrological Sub-system	Scheme	Source of Water	Irrigable Area based on Water Availability (ha)		Topographically Irrigable Area (ha)				Catchment Area (km ²)
			Wet Season	Dry Season	Rainfed Paddy Field		Bush in		
					Alluvial Plain	Swamp Area	Alluvial Plain	Total	
Tabalong									
Tabalong Kanan	1. Liang Tapah	S. Jaro	-	-	220	-	-	220	-
	2. Sungai Kati	S. Jaro	-	-	280	-	-	280	-
	3. Namun	S. Namun	64	22	115	-	-	115	1
	4. Kinarum	S. Kinarum	3,019	1,034	408	-	-	408	47
Upper Tabalong	5. Mihim	S. Mihim	1,173	365	203	-	-	203	16
	6. Batu Pulut	S. Mihim	-	-	225	-	-	225	-
	7. Bilas	S. Jaing	3,740	1,163	643	-	-	643	51
	8. Banyu Tajun	S. Uwi	7,473	2,325	750	-	-	750	102
Sub-Total			15,469	4,909	2,844	-	-	2,844	
H.S.U.									
Balangan	1. Balangan	S. Balangan	26,374	8,997	2,172	-	-	2,172	453
Pitap	2. Pitap	S. Pitap	16,186	5,521	3,734	785	-	4,519	278
Sub-Total			42,560	14,518	5,906	785	-	6,691	
H.S.T.									
	1. Batang Alai	S. Batang Alai	18,288	8,694	6,223	600	-	6,823	318
	2. Barabai	S. Barabai	9,202	4,374	2,278	800	-	3,078	160
Sub-Total			27,490	13,068	8,501	1,400	-	9,901	
H.S.S.									
Angkinang	1. Kayu Habang	S. Kayu Habang	464	147	347	-	-	347	13
Amandit	2. Amandit	S. Amandit	16,984	5,393	6,432	-	-	6,432	476
Sub-Total			17,448	5,540	6,779	-	-	6,779	
Tapin									
Tapin	1. Tapin	S. Tapin	12,131	3,852	3,228	400	2,100	5,728	340
	2. Labuhan	S. Tapin	500	159	300	-	-	300	14
Sub-Total			12,631	4,011	3,528	400	2,100	6,028	
Total			115,598	42,046	27,558	2,585	2,100	32,243	

Table 4.4 Water Availability at New Irrigation Water Source Facilities

Project	Catchment Area (km ²)	River Discharge (m ³ /sec)											
		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
1. WITHOUT DAM CONDITION													
Lisng Tapah	-	-	-	-	-	-	-	-	-	-	-	-	-
Sungai kali	1	0.04	0.04	0.04	0.04	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.04
Namun	47	2.05	1.96	1.97	1.70	1.38	1.03	0.89	0.79	0.72	0.79	1.15	1.88
Kisarum	16	0.74	0.72	0.74	0.65	0.49	0.38	0.31	0.27	0.27	0.30	0.45	0.74
Batipulut	-	-	-	-	-	-	-	-	-	-	-	-	-
Bilas	51	2.36	2.29	2.35	2.05	1.55	1.20	1.00	0.86	0.86	0.95	1.42	2.36
Banyu Tajun	102	4.71	4.59	4.71	4.14	3.11	2.40	2.00	1.71	1.72	1.91	2.84	4.72
Balangang	453	16.45	16.12	13.64	10.55	10.11	9.38	7.74	6.32	6.18	6.23	10.02	14.86
Pitap	278	10.10	9.89	8.37	6.48	6.21	5.76	4.75	3.88	3.79	3.83	6.15	9.12
Batang Alai	318	13.60	14.25	14.19	13.21	11.31	9.07	7.48	5.79	4.79	4.67	6.95	11.42
Barabai	160	6.84	7.17	7.14	6.64	5.69	4.56	3.76	2.92	2.41	2.35	3.50	5.75
Kayu Habang	13	0.43	0.41	0.46	0.36	0.28	0.19	0.13	0.10	0.09	0.11	0.18	0.32
Amandit	476	15.82	15.01	16.93	13.34	10.07	7.02	4.64	3.57	3.36	4.04	6.45	11.67
Tapin	340	11.30	10.72	12.10	9.53	7.19	5.02	3.31	2.55	2.40	2.89	4.61	8.33
Labuhan	14	0.47	0.44	0.50	0.39	0.30	0.21	0.14	0.10	0.10	0.12	0.19	0.34
2. WITH DAM CONDITION													
Balangan	-	-	-	-	-	-	-	-	-	-	-	-	-
- Dam	46	1.67	1.64	1.39	1.07	1.03	0.95	0.79	0.64	0.63	0.63	1.02	1.51
- R.C.	407	14.78	14.48	12.25	9.48	9.08	8.43	6.95	5.68	5.55	5.60	9.00	13.35
Pitap	-	-	-	-	-	-	-	-	-	-	-	-	-
- Dam 1	126	4.58	4.48	3.79	2.94	2.81	2.61	2.15	1.76	1.72	1.73	2.79	4.13
- Dam 2	117	4.25	4.16	3.52	2.73	2.61	2.42	2.00	1.63	1.60	1.61	2.59	3.84
- R.C. 1	152	5.52	5.41	4.58	3.54	3.40	3.15	2.60	2.12	2.07	2.10	3.36	4.99
- R.C. 2	161	5.85	5.73	4.85	3.75	3.60	3.34	2.75	2.25	2.19	2.22	3.56	5.28
Batang Alai	-	-	-	-	-	-	-	-	-	-	-	-	-
- Dam	110	4.71	4.93	4.91	4.57	3.91	3.14	2.59	2.00	1.66	1.62	2.40	3.95
- R.C.	208	8.89	9.32	9.28	8.64	7.40	5.93	4.89	3.79	3.13	3.05	4.55	7.47
Barabai	-	-	-	-	-	-	-	-	-	-	-	-	-
- Dam	71	3.04	3.18	3.17	2.95	2.53	2.03	1.67	1.29	1.07	1.04	1.55	2.55
- R.C.	89	3.80	3.99	3.97	3.69	3.16	2.53	2.09	1.63	1.34	1.31	1.95	3.20
Amandit	-	-	-	-	-	-	-	-	-	-	-	-	-
- Dam	310	10.30	9.78	11.03	8.69	6.56	4.57	3.02	2.32	2.19	2.63	4.20	7.60
- R.C.	166	5.52	5.23	5.90	4.65	3.51	2.45	1.62	1.25	1.17	1.41	2.25	4.07
Tapin	-	-	-	-	-	-	-	-	-	-	-	-	-
- Dam	275	9.14	8.67	9.78	7.70	5.82	4.06	2.68	2.06	1.94	2.34	3.73	6.74
- R.C.	65	2.16	2.05	2.32	1.83	1.37	0.96	0.63	0.49	0.46	0.55	0.88	1.59

Remarks: R.C. : Remnant Catchment

Table 4.5 Command Areas of New Irrigation Schemes

(Unit: ha)

Kabupaten	Scheme	Scheme Area		Water Supply to Drainage Scheme		Total Irrigable Area		Scheme Area
		Wet Season	Dry Season	Wet Season	Dry Season	Wet Season	Dry Season	
Tabalong	31. Sungai Kati	280	42	0	0	280	42	280
	32. Namun	64	22	0	0	64	22	64
	33. Kinarum	408	408	0	0	408	408	408
	34. Mihim	203	203	0	0	203	203	203
	35. Batupulut	225	162	0	0	225	162	225
	36. Bilas	643	643	0	0	643	643	643
	37. Banyu Tajun	750	750	0	0	750	750	750
	Sub-Total	2,573	2,230	0	0	2,573	2,230	2,573
H.S.U	38. Balangan	2,172	2,172	0	0	2,172	2,172	2,172
	39. Pitap	3,734	3,734	0	785	3,734	4,519	4,519
	Sub-Total	5,906	5,906	0	785	5,906	6,691	6,691
H.S.T	40. Batang Alai	6,223	6,223	600	600	6,823	6,823	6,823
	41. Barabai	2,278	2,278	800	800	3,078	3,078	3,078
	Sub-Total	8,501	8,501	1,400	1,400	9,901	9,901	9,901
H.S.S	42. Kayu Habang	347	147	0	0	347	147	347
	43. Amandit	6,432	5,393	0	0	6,432	5,393	6,432
	Sub-Total	6,779	5,540	0	0	6,779	5,540	6,779
Tapin	44. Tapin	5,328	3,452	400	400	5,728	3,852	5,728
	45. Labuhan	300	159	0	0	300	159	300
	Sub-Total	5,628	3,611	400	400	6,028	4,011	6,028
Total		29,387	25,788	1,800	2,585	31,187	28,373	31,992

Table 4.6 Comparison between Weir and Dam Construction Costs

Scheme	Dam Construction					Total	Weir Total Cost
	Dam	Headworks	Main & Tertiary System	Supply Canal	Land Acquisition		
Amandit							
Option 1	30,595	4,506	40,308	119	1,957	77,485	41,433
Option 2	31,976	4,506	41,085	135	1,979	79,681	41,465
Option 3	57,258	4,506	58,548	12,778	2,746	135,836	44,693
Tapin							
Option 1	54,187	3,577	36,852	-	2,285	96,901	37,254
Option 2	59,195	3,577	38,149	-	2,386	103,307	37,254
Option 3	112,488	3,577	49,700	36,326	3,702	205,793	58,724

Table 6.1 Work Items and Quantities for Existing Schemes (1/2)

Kabupaten	Scheme	Level of Irrigation System	Scheme Area (ha)	Rehabilitation						
				Weir (nos)	Intake (nos)	Irrigation Canal (m)	Drainage Canal (m)	Canal Structure (nos)	Inspection Road (m)	Embankment (m)
Tabalong	1. Jaro	T	625	1	1	300	-	4	-	-
	2. Jaro Bawah	S	200	-	-	-	-	-	-	-
	3. Gumba	S	254	1	1	2,250	-	-	-	-
	Sub-Total		1,079	2	2	2,550	-	4	-	-
H.S.U	4. Paran	S.T	188	-	1	1,430	800	-	-	-
	5. Tundakan	S.T	233	-	-	-	-	2	-	-
	6. Suapin	S.T	116	-	-	-	-	1	-	-
	7. Lok Batu	S.T	116	-	1	7,610	-	12	-	-
Sub-Total		653	-	2	9,040	800	15	-	-	
H.S.T	8. Talang	S	165	-	-	470	-	3	800	-
	9. Tapuk	S	186	-	-	350	-	3	3,000	-
	10. Tamiyang	S	166	1	-	800	-	7	-	-
	11. Baruh Hawang	S	160	-	-	800	-	4	-	30
	12. Intangan	T	920	1	-	3,100	2,000	10	10,960	-
	13. Kahakan	T	633	-	-	600	-	3	-	10
	14. Mangunang	S.T	515	-	-	500	2,000	4	5,720	-
	15. Haruyan Dayak	T	1,486	-	-	400	-	4	-	-
Sub-Total		4,231	2	-	7,020	4,000	38	20,480	40	
H.S.S	16. Telaga Langsung	T	1,534	-	-	5,130	-	4	7,590	-
	17. Tayub	S.T	178	-	-	800	-	-	-	-
	18. Nunungin	S	36	-	-	80	-	-	-	-
	19. Kuangun	S.T	143	-	-	2,700	-	4	-	-
	20. Pamujaan	S	214	-	-	2,000	-	1	-	-
	21. Hawatu	S	71	-	-	-	-	-	-	-
	22. Taal	S.T	107	-	-	1,200	-	1	-	-
	23. Jarau	T	143	-	-	2,000	5,000	3	-	-
	Sub-Total		2,426	-	-	13,910	5,000	13	7,590	-
	Tapin	24. Lok Paikat	T	392	-	-	500	-	-	-
25. Pampain		S.T	392	-	-	3,280	-	-	-	-
26. Nupadang		T	253	-	-	500	-	-	-	-
27. Tatakan		S.T	99	-	-	520	-	1	-	-
28. Pulau Pinang		S.T	270	-	-	30	4,800	-	-	-
29. Rampanang		T	146	-	-	-	500	-	-	-
30. Binuang		T	1,106	-	-	2,150	-	4	4,500	-
Sub-Total		2,658	-	-	6,980	5,300	5	4,500	-	
Total		11,047	4	4	39,500	15,100	75	32,570	40	

Table 6.1 Work Items and Quantities for Existing Schemes (2/2)

Kabupaten	Scheme	Level of Irrigation System	Scheme Area (ha)	Renewal		Construction			Further Extension	
				Weir (nos)	Measurement Structure (nos)	Main System (ha)	Tertiary System (ha)	Drain System (ha)	Tertiary System (ha)	Drain System (ha)
Tabalong	1. Jaro	T	625	-	-	-	-	-	-	-
	2. Jaro Bawah	S	200	1	-	200	200	200	-	-
	3. Gumba	S	254	-	12	-	254	254	-	-
	Sub-Total		1,079	1	12	200	454	454	-	-
H.S.U	4. Parau	S.T	188	-	10	64	188	188	-	-
	5. Tundakan	S.T	233	-	17	-	233	233	-	-
	6. Suapin	S.T	116	-	10	-	116	116	267	267
	7. Lok Batu	S.T	116	-	20	-	116	116	291	291
	Sub-Total		653	-	57	64	653	653	558	558
H.S.T	8. Talang	S	165	-	17	-	165	165	-	-
	9. Tapuk	S	186	-	-	-	186	186	-	-
	10. Tamiyang	S	166	-	13	-	166	166	-	-
	11. Baruh Hawang	S	160	-	3	47	160	160	-	-
	12. Intangan	T	920	-	7	-	920	920	260	260
	13. Kahakan	T	633	-	12	-	633	633	144	144
	14. Mangunang	S.T	515	-	8	-	515	515	-	-
	15. Haruyan Dayak	T	1,486	-	16	-	1,486	1,486	-	-
	Sub-Total		4,231	-	83	47	4,231	4,231	404	404
H.S.S	16. Telaga Langsung	T	1,534	-	18	-	1,534	1,534	-	-
	17. Tayub	S.T	178	-	6	-	178	178	22	22
	18. Nunungin	S	36	1	3	-	36	36	129	129
	19. Kuangun	S.T	143	-	10	-	143	143	92	92
	20. Pamujan	S	214	-	4	-	214	214	-	-
	21. Hawatu	S	71	1	-	256	71	71	185	185
	22. Taal	S.T	107	-	21	-	107	107	182	182
	23. Jarau	T	143	-	1	-	-	143	-	-
	Sub-Total		2,426	2	63	256	2,283	2,426	610	610
	Tapin	24. Lok Paikat	T	392	-	6	-	392	392	-
25. Pampain		S.T	392	-	18	-	392	392	490	490
26. Nupalang		T	253	-	1	-	253	253	-	-
27. Tatakkan		S.T	99	-	8	-	99	99	-	-
28. Pulau Pinang		S.T	270	-	-	-	270	270	-	-
29. Rampanang		T	146	-	3	-	146	146	-	-
30. Binuang		T	1,106	-	10	-	1,106	1,106	-	-
Sub-Total		2,658	-	46	-	2,658	2,658	490	490	
Total		11,047	3	261	567	9,825	9,968	2,062	2,062	