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THE CENTRAL SOUTH SULAWESI
WATER RESOURCES DEVELOPMENT PROJECT

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Table of Contents

List of Table

List of Figures

CHAPTER 1 POLITICAL AND SOCIAL BACKGROUND

1.1 POLITICAL BACKGROUND

Political and Social background is summarized in the following way based on the report "Sulawesi Regional Development Study" prepared by the University of British Colombia for CIDA.

During the latter part of the colonial regime, Sulawesi Selatan (South Sulawesi) was a part of the residency of Celebes and Dependencies.

The residency consisted of seven districts, six of which (Makassar, Bonthain, Bone, Pare-Pare, Mandar, Luwu) were in South Sulawesi.

European influence was first felt in the early 1600's with the arrival of the Portuguese and the Dutch in Makassar. The Dutch made use of the rivalries between the Kingdom of Gowa (Makassarese) and the Kingdom of Bone (Bugisnese) in their attempts to gain full control of trade in the area. In general, Dutch did not extend their control to political governance in this period. Makassar (Ujung Pandang) was the important trade centre first for the Portuguese and then Dutch between 1600 and 1900, but their direct control dit not extend far beyond the city.

This changed between 1905 and 1910 when the Dutch embarked on a military campaign during which all rules of major and minor Kingdoms in South Sulawesi swore loyalty to the queen of the Netherlands.

At independence, Makassar became the capital of the province of Sulawesi, encompassing the whole island. Subsequent divisions led to the establishment of four provinces in 1964, one of which was Sulawesi Selatan. Today Sulawesi Selatan consists of 23 level II administrative regions, two kotamadyas and 21 kabupatens.

The political situation in the province was rarely calm between 1945 and 1965. The fighting and political instability during the period led to rapid deterioration of the physical infrastructure.

1.2 SOCIO BACKGROUND

Based on language, ethic considerations and the influence of traditional rulers, four major ethnic groups - the Buginese, Makassarese, Toraja and Mandarese can be indentified. The Makasarese are located generally in the south of the peninsula, the Buginese in the central area, the Mandarese in the north-west and the Toraja in the north and north-east portions of the province.

There are several other small groups within these four. At the time of the 1930 census, the population was classified as 52% Buginese, 24% Makasarese, 14% Toraja, 7% Mandarese and 3% others. People of chinese origin have played an important role in business and commerce in the province for several hundred years. They reside almost exclusively in urban centers.

Wet rice cultivations are believed to have been introduced in Sulawesi Selatan over 300 years ago. The Buginese are well known throughout Indonesia for their ability as wet-rice cultivators. Wet-rice cultivation was well spread throughout the arable plains area of the Makasarese and Mandarese and in the Toraja upland by the 19th century.

The Buginese and Makassarese are known throughout south-east Asia as seafarers and traders. The Makassarese earned income from the spice trade from the mid-sixteenth century. The Buginese, Makassarese and Mandarese are famous for their wooden sailing craft, evident in the harbours of Indonesia.

Sulawesi Selatan society is often described by other Indonesians as traditional. Islam forms a very significant element in the identity of most Sulawesi Selatan people. The aristocracy in the province demands more respect and plays a stronger role than in other provinces of Sulawesi. Within the province, the greatest cultural differences exist between the Toraja and non-Toraja people. The Buginese, Makassarese and Mandarese all have similar cultural traits, are Muslim and generally lowland dwellers. The Toraja people are largely upland dwellers and predominantly Christian or followers of the traditional Toraja religion.

Although the province is predominantly Muslim, significant Christian minorities exist in Kabupaten Tana Toraja, Polmas, Mamuju, Luwu, Gowa and Kotamadya Pare-Pare and Ujung Pandang. Other religious groups form a significant minority in Kabupaten Tana Toraja (traditional Toraja religion) and Kotamadya Ujung Pandang (Chinese religions). There is a general association of non-Islamic beliefs with urban centers and the upland areas.

CHAPTER II ECONOMIC PLAN

2.1 PHILOSOPHY

The third economic development plan is based on the following philosophy

(1) The equal distribution of development directed towards the achievement of social justice

(2) Higher economic growth

(3) The achievement of national stability principles of the development in REPELITA III must be based on the present reality and the estimation of the international and national economic situation within the period of future five years. The good and successful projects must be continued, if they have enough development potentials and experience of the failure in the proposed projects must be used in effective way for REPELITA III

Activities for the equal distribution of social justice are made of 8 principles.

(1) To equalize satisfaction of the basic needs, especially for foods, clothes and houses

(2) To equalize the opportunity to be able to get educational and public health services

(3) To equalize the income distribution

(4) To equalize the employment opportunity

(5) To equalize the opportunity to participate for the private business activities

(6) To equalize the participation opportunity of the young generation and women for the development

(7) To equalize the regional development gap

(8) To equalize the opportunity to accept the justice

These principles aim at the development of the depressed area and improvement of living standard of the poor people from not only economic but also social point of views.

2.2 GOALS

Goals for the water resources development sector in REPELITA III are composed of 4 items.

(1) To increase the food production, especially for rice

(2) To encourage the transmigration plan

(3) To accelerate industrial development

(4) To keep the required water supply for the inhabitants in the city

2.3 DEVELOPMENT PLAN FOR SOUTH SULAWESI PROVINCE

(1) Goals

The main problems of South Sulawesi are water resources. This is due to the small percentage of forest area, i.e. about 22% of total area, while about 30% is needed for a proper hydrological functioning.

Development goals for South Sulawesi during REPELITA III are of the following theme.

(a) Agricultural development mainly for the purpose of the food increase

(b) Industrial development depending upon the development of electric power resources

(2) Development Policy

(a) To strengthen the role as a rice belt in the east part of Indonesia and extend the technical irrigation area for rice production

(b) To establish the required conditions for the industrial development on the basis of acquisition of electric power.

(3) Development Strategy

Water resources development is the base for the agricultural and industrial development. And following development strategy for the water resources development is used

(a) Erosion control

(b) River control

(c) Technical irrigation

(4) Development Area, Projects and Methods

(a) Development area

South Sulawesi is divided into 4 development areas (according to PELITA II)

- South development area
  Ujung Pandang is a core of this area as a service centre to whole east Indonesia and this area is highly depressed area.

- West development area
  Pare-Pare is a centre of this area with the highest rice production belt in this province and this area is exporting a plenty of rice to the other provinces.

- East development area
  With Watampone as a regional centre, this area is producing not only rice but also maize and industrial crops and its population density is comparatively high.

- North development area
  Palopo is a biggest city and this area is comparatively abundant with forest and mineral resources. Land is enough for the expansion of rice production area.

(b) Development Project and Development Method

The projects listed below were proposed by BAPPEDA of South Sulawesi as the development projects during REPELITA III.

- Sumpang Karama Project (including the rehabilitation of irrigation facilities and development of electric power resources)

- Sadang Irrigation project (including the development of electric power resources)

- Tabo-Tabo Irrigation project

- Kelara Irrigation project

- Luwu Irrigation project (including transmigration project)

- Palm oil Project of Wuotu (in close contacts with Luwu transmigration project)

- Tana Toraja coffee project (by the joint venture of Japan and Indonesia)

- Clove Development Project (along the east coast of the province)

- Projects for the improvement of cattle breeding and transportation method

- Fisheries Development Projects (for the production increase of exported shrimps)

(5) Transmigration Project

(a) BAPPENAS

Only Luwu and Majene are the suitable and objective areas for the transmigration projects in this province. For the other Kabupatens, internal migration and resettlement of the people, within South Sulawesi province, must be considered. We can see many seasonal outmigrant from South Sulawesi to Kalimantan, Sumatera, etc.

This phenomenon has occured in Bone and other areas, where the employment opportunity is very low in dry season. In order to resolve these problems, creation of job opportunity and resettlement plan for these people must be included for the internal migration plan.

Transmigration projects are important in the part of this province and internal migration method must be taken into consideration for the people in the southern part of this province.

(b) BAPPEDA

Luwu and Majene, located in the north of this province, are the objective areas for transmigration. And the other areas of this province are excluded from the transmigration planning.

(c) CIPTA KARYA (by CIDA)

- Sulawesi Selatan gives increased attentions to internal population and settlement problems and place greater emphasis upon resettlement.

- No further transmigration into the province take place. This together with the first recommendation, will require a substantial reallocation of funds.

- All undeveloped arable land in Kecamatan Malili, Kabupaten Luwu, is made available for resettlement, particularly to people from Tana Toraja which faces major population pressures on land resources.

- The Mamuju plain, after the necessary studies recommended have been completed, is developed through partially aided settlement of people from priority regions in the province including Tana Toraja, swidden cultivators from within the Kabupaten, and areas undergoing out-migration.

Pending completion of the master plan, a clear policy statement should be made reserving the area for settlement from designated area within the province, and

- The transmigration Regional Office limits its activities to the development of its current projects in the north Luwu area.

(6) Road and Bridge Rehabilitation Project

(a) BAPPEDA and BAPPENAS

Almost all national and provincial roads will be improved with the national budget during REPELITA III.

The section of the road, from Watangsoppeng to Pangkajene, Takkalala to Baru and Polewali to Mamasa, is planned to be improved using the provincial budget source.

(b) CIPTA KARYA (by CIDA Report)

Road projects were evaluated using the following criteria:

(i) To connect major centers of population

(ii) To connect major population centers to major seaports, airports and ferry terminals,

(iii) To connect major population centers and seaports to important natural resource development areas and centers of production,

(iv) To provide transportation access to areas proposed for development in the short and long-term, and

(v) To provide all weather road links to existing population centers before expanding capacity of existing all weather links.

The four Kabupatens, Wajo, Soppeng, Sidrap, Bone, form a contiguous area of agricultural activity with potential for increased output principally through intensification.

Five road sections within this area identified for improvement by the SRDS plan; Ujung Lamuru - Bajo in REPELITA III, Tarumpakae - Sengkang - Ujung Lamuru, Pangkajene (Sidrap) - Soppeng - Cabbenge and Malino-Tondong in Long-Term Stage I, and Pakkae-Takkalala in Long-Term Stage II. The costs of this work is Rp.2,100 million for 70 km in REPELITA III, Rp.8,850 million for 265 km in Long-Term Stage I and Rp.1,750 million for 60 km in Long-Term Stage (Fig. 2.3). The Ujung Lamuru - Tarumpake section together with the Ujung Pandang - Maros and Maros - Ujung Lamuru links form an alternative highway to Palopo and the north-east area of the province. The Ujung Lamuru - Bajo section is linked to the development of the Sanrego area.

(c) BINA MARGA

Road betterment projects are prepared in Whole area, but there is no construction project of the road. Bridge construction projects will be prepared, based upon the planning Report by CIDA under BINA MARGA and Canadian cooperation.

Total budget of bridge and road rehabilitation projects, in whole country, during REPELITA III, is Rp.1,626 billion from Central Gov. and Rp.338 billion from Provincial Government. For South Sulawesi, budget is allocated Rp.63 billion (3-4% of total budget of Indonesia) for this purpose.

CHAPTER III NATIONAL BUDGET

3.1 GENERAL ASPECTS

The draft of the government budget for this fiscal year -- the first year of the third five year plan -- which amounts to Rp.6.9 trillion (US$11.04 billion), or an increase of 43.7% compared with the current fiscal years budget, 3.4 trillion rupiahs will be used to finance routine expenditures and the other 3.5 trillion rupiah are allocated for development costs. With the government's "Balanced budget" policy Rp.5.4 trillion of the budget will come from domestic revenues and the rest from foreign aid.

This amount of the budget is about 15 times of the budget in 1970/1971. Ratio of domestic revenues to total revenues has been increasing since 1970/1971. In next fiscal year (1979/80), total revenues are Rp.6.9 trillion.

The domestic revenues are Rp.5.4 trillion (78% of total revenues) and sources from foreign aid becomes 22% of total revenues (Rp.1.5 trillion).

Development expenditures are highly increasing compared with the increase of routine expenditures. It means that central government has encouraged the economic development during the periods of PELITA I and PELITA II. However, the ratio of development expenditures to total expenditures seems to reach the saturation point in recent years. Its ratio is about 50% of total expenditures.

In 1979/80, total development expenditures are about Rp.3.5 trillion. Within the development expenditures dependency ratio to foreign aid is 68% in 1970/71. And its ratio has been decreasing with the success of economic development during PELITA I, Since 1974/75. It's about 40% (Rp.1.5 trillion) in 1979/80.

3.2 BUDGET ALLOCATION FOR WATER RESOURCES DEVELOPMENT

(1) Budget Allocation to South Sulawesi Province

During PELITA I, budget allocation to South Sulawesi water resources development was around 2.8% of total development budget of water resources development by D.P.U. This ratio increased in PELITA II to 3.5%. (Rp.18.8 billion). It means that the water resources development has been encouraged, during these years, especially for irrigation project, in order to increase rice production.

(2) Budget Allocation to Each Sector

For whole Indonesia, sectoral allocation of water resources development is as follows;

During the periods of PELITA I and PELITA II, both economic plans have invested 60 to 65% of total water resources development budget into the rehabilitation and construction of irrigation facilities.

The rest of this budget (35% of total water resources development budget) was put into development and improvement of river and swamp area.

On the other hand, development budget for water resources development in South Sulawesi was used intensively for the rehabilitation and construction of irrigation facilities.

95 - 100% of total water resources development budget was put into these sectors. Only a few percentage of total water resources development budget was expended for the river improvement projects. Water resources development of South Sulawesi was almost the same as the rehabilitation and construction of irrigation facilities. For this province, rice production increase through the improvement of irrigation project is the urgent issues to be solved.

This tendency will continue until rice production target is realized, followed by river improvement project.

(3) Budget Allocation for the Programmes in South Sulawesi

(a) For PELITA I

Rp.1,890 million, 59% of total water resources development budget (Rp.3,204 million) was expended for the use of rehabilitation of irrigation facilities. And 37% of this total budget -- Rp.1,186 million -- was for the construction of new irrigation projects.

82% of budget for rehabilitation of irrigation facilities, was allocated to Sadang irrigation under PROSIDA. And 97% of the budget for construction of new irrigation facilities was used for Kelara irrigation project. It means that Rp.2,691 million, 84% of total water resources development budget was for these two special big projects during the period PELITA I.

(a) PELITA II

Rp.8,755 million - 47% of total water resources development budget (Rp.18,845 million) was allocated for the use of rehabilitation projects of irrigation facilities. And 52% of this total budget (Rp.9,849 million) was for the construction of new irrigation facilities. Sadang irrigation project under PROSIDA was budgeted Rp.7,007 million, 80% of total rehabilitation budget of irrigation facilities. Sadang project was the mainwork among water resources development projects both in PELITA I and PELITA II. Its rehabilitation will be completed for the planned main irrigation channels near future. Sadang project area is adjacent to our objective area and has many experiences for the completion of the project.

Total investment to Sadang project during PELITA I and PELITA II is around Rp.8,552 million.

PELITA I	Rp.1,545 million
PELITA II	Rp.7,007 million
Total	Rp.8,552 million

The budget for the construction of new irrigation facilities was allocated to two programs. One is for Luwu irrigation project including transmigration project. Other project is for small irrigation program, called SEDERHANA.

Budget for Luwu was Rp.4,156 million, 42% of total construction budget of new irrigation facilities and that for SEDERHANA was about 37% (Rp.3,617 million).

(c) P.3.S.A.

Budget for P.3.S.A. was allocated as follows. Total expenditure of this project becomes Rp.467 million.

1974/75	Rp.0 million
1975/76	31
1976/77	41
1977/78	85
1978/79	310
Total	Rp.467 million

For the next fiscal year, Rp.250 million is going to be prepared.

CHAPTER IV NATIONAL ECONOMIC ANALYSIS

4.1 POPULATION, AREA AND POPULATION DENSITY

Total population of whole Indonesia is 135 x 10^6 in 1976 and its area is 1,900,000 km^2.

Population density becomes 51 person/km^2. Total population of South Sulawesi is about 5,700,000, 4% of total population of whole Indonesia. Area of this province is 78,000 km^2 and population density is 72 persons/km^2.

4.2 RICE BELT OF EAST INDONESIA

South Sulawesi has an important role for the supply of rice to rice deficit area of eastern part of Indonesia. Surplus of rice of this province in 1976/1977 is estimated about 100,000 tons. 70,000 tons of this surplus was exported to the external regions of South Sulawesi.

In this interinsular trade of rice, much quantities were transported to Maluku and East Kalimantan in this year -- around 15,000 tons to each province. And 7,000 to 10,000 tons of rice was exported to South East Sulawesi and Central Sulawesi. In 1975/76, 15,700 tons was for the supply to Irian Jaya.

4.3 IMPORT OF RICE

Import of rice is fluctuating year by year. It means that production of rice is unstable in this country. During 1971 and 1973, there seems to be succeeded in the development policy, because of the reduction of imported rice. However, since 1972, severaly damaged through drought, quantities of rice imported have been strikingly increasing. In 1973, total imports of rice became 1,860,000 tons and in 1976 it became 1,300,000 tons.

Interinsular trade of rice in 1976 is estimated 70,000 tons in South Sulawesi. The quantities correspond to only about 5% of total imported rice. Therefore, South Sulawesi must increase rice more in order to supply rice to the deficit area. On the other hand, only 120,000 tons in 1971 was imported in whole Indonesia. This corresponds to 60% of total quantities exported from South Sulawesi to the other domestic area in 1976. If the stability of rice production is accomplished through the rehabilitation of irrigation facilities and improvement of agricultural technology, requirement to rice increasing project will be in a lower priority.

As an urgent issue, rice increasing project must be planned and implemented in South Sulawesi with abundant water resources.

But at the same time, diversification programs of agricultural products and some policy to increase income from industrial origin must be taken into considerations for the long term plan.

4.4 STABILIZATION OF PADDY PRODUCTION

Paddy productivity in 1976 is 3.7 tons/ha in South Sulawesi and 4.0 tons/ha in Java. Rice productivity in South Sulawesi is comparatively high. However, rice productivity of Java is stable every year compared with South Sulawesi. For South Sulawesi, stabilization for rice productivity is one of the important issues for the future.

4.5 MANPOWER

The population per harvested area of paddy in South Sulawesi and Kalimantan is smallest, that is,

in Kalimantan	--	8 persons/ha
in South Sulawesi	--	12 persons/ha

CHAPTER V REGIONAL ECONOMIC ANALYSIS

Objective area of this project is in 4 Kabupatens -- Wajo, Bone, Soppeng and Sidrap, and includes 29 Kecamatans. Present economic conditions of these 4 Kabupatens are as follows;

5.1 POPULATION, AREA AND POPULATION DENSITY

Total population of objective area is about 1 million in 1977. This population corresponds to 25% of total number in South Sulawesi. (Table 5.2)

Wajo	:	370,000 (26%)
Bone	:	620,000 (43)
Soppeng	:	240,000 (17)
Sidrap	:	200,000 (14)
Total	:	1,430,000 (100)

Total area is about 10,600 km^2 -- 15% of that of South Sulawesi (72,800 km^2)

Wajo	:	2,300 km^2 (22%)
Bone	:	4,600 (43)
Soppeng	:	1,400 (13)
Sidrap	:	2,300 (22)
Total	:	10,600 (100)

Population density of this area is 135 persons/km^2. This value is higher than the average of that in South Sulawesi.

Wajo	:	163 persons/km^2
Bone	:	137 persons/km^2
Soppeng	:	172 persons/km^2
Sidrap	:	84 persons/km^2
Total	:	135 persons/km^2

5.2 UNSTABLE PADDY PRODUCTION

Paddy in South Sulawesi is not produced in a stable way by years. Its production in wet season is extremely damaged, and as a result of it, paddy is not produced with constant quantities. Stabilization of wet season paddy production is an urgent problem to be solved. (Table 5.3)

5.3 DISTRIBUTION OF AGRICULTURAL PRODUCTS (Fig. 5.1)

(1) Sidrap -- Area with a plenty of surplus rice due to success of Sedang irrigation project under PROSIDA and area with paddy production equally not only in wet season but also in dry season
-- Rice Belt

(2) Soppeng -- Area with a plenty of rice production both in wet and dry season, and area with much income from producing tobacco and other upland crops.

(3) Wajo -- Area with production of paddy only in wet season, because of a lack of irrigation facilities and shortage of rainfall, and area with vegetables, tobacco and sugarcane in dry season.

(4) Bone -- Area with paddy production only in wet season due to the worse irrigation system, but area with abundant marine and brackish fish resources, and maize, cassava, sugarcane and tobacco.

5.4 PADDY PRODUCTION AND PRODUCTIVITY

Recent years, in wet season, Soppeng and Sidrap have increased so much paddy productivity compared with Wajo and Bone. In 1974 and 1975, the regional difference of paddy productivity in wet season was too small, but in 1977, its gap among advanced Kab. and depressed Kab. became remarkable. Productivity per harvested area of wet season paddy is 2.5 tons/ha in Wajo and Bone, and that of Soppeng and Sidrap is 4.5 tons/ha in 1977. Increase of wet season paddy productivity in the depressed area is one of the important issues for this project. Also, in dry season paddy, its productivity is strikingly different among well developed area and depressed area. In Sidrap and Soppeng, paddy is produced twice a year, but in Wajo and Bone, paddy production is only limited in wet season. For these depressed Kabupaten, expansion and rehabilitation of irrigated area in dry season are indispensable for the future rice development plan. (Fig. 5.2) Productivity of paddy in dry season in Sidrap has strikingly increased owing to the rehabilitation project of irrigation facilities in Sadang. Its productivity became 5.6 tons/ha in 1977. And also in Soppeng, its productivity is very high and reached 4.8 tons/ha in 1977.

5.5 DAMAGE OF WET SEASON PADDY

In Wajo, damaged ratio of wet season paddy is extremely high. But in Soppeng and Sidrap, its ratio is very small and in stable conditions (Fig. 5.3 to 5.6)

(1) Wajo

In 1976, 45% of 67,000 ha -- total planted area in wet season is damaged. Damaged area is about 30,000 ha. More than 50% of total planted area was damaged in 1977. Its area is 32,000 ha. Almost all damages of wet season paddy were mainly caused by drought both in 1976 and 1977.

(2) Bone

Damaged ratio of paddy in Bone is smaller than of Wajo, but 22% (16,000 ha) of total planted area (72,000 ha) was damaged in 1976 and 16% (12,000 ha) in 1977. In 1976 and 1977, almost all damages were mainly caused by drought. In 1977 some parts were damaged by flood.

(3) Soppeng

90% of total planted area was harvested in 1976. Only 10% of total planted area was damaged in this year. In 1977 damaged ratio increased in 20% of total planted area. Damage is mainly caused by drought in 1976 and by flood in 1977. In 1977, big flood was brought by Walanae river.

(4) Sidrap

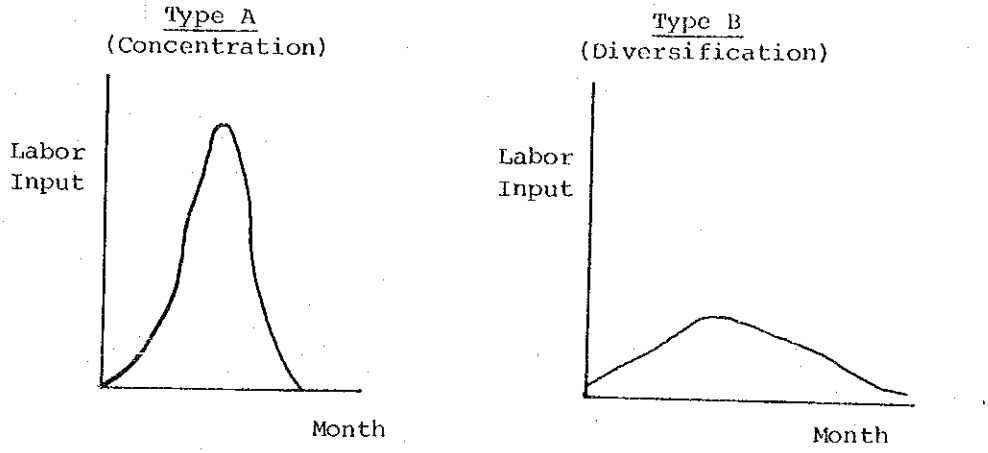
In 1976, only 10% (4,000 ha) of total planted area was damaged mainly through drought. And in 1977, 18% (7,000 ha) of total planted area was damaged through flood and drought.

Year	Kabupaten	Main Cause
1976	Wajo	Drought (27,300 ha)
	Bone	Drought (14,000 ha)
	Soppeng	Drought (2,100 ha)
	Sidrap	Drought (3,700 ha)
1977	Wajo	Drought (14,000 ha), Flood (800 ha)
	Bone	Drought (9,400 ha), Flood (1,600 ha)
	Soppeng	Drought (600 ha), Flood (3,600 ha)
	Sidrap	Drought (2,300 ha), Flood (2,300 ha)

Source: Agr. Department of South Sulawesi

5.6 CONCENTRATION AND DIVERSIFICATION OF FARMING PERIOD

Wajo and Bone, paddy planting and harvesting is focussed in a limited period of wet season. On the other hand, such a work of Soppeng and Sidrap is evenly distributed in a whole year.



The difference of this centralization and diversification of agricultural work among these Kabupatens comes from the conditions of irrigation facilities.

(1) Wajo and Bone : Small Irrigated area

(2) Soppeng and Sidrap : Large Irrigated area and area with effective rainfall for paddy production in a whole year.

In Wajo and Bone, paddy production depends upon natural rainfall without well irrigated area. Therefore farmers concentrate their planting activities in a short period of wet season. It means that working, is concentrated in a short period not only in planting season but also harvesting season.

Due to the centralization of work in a limited period, paddy is easy to suffer damage at a same time in a highest degree. And this centralization of work means uneffective use of labour power. Only for a short period, many labourers are needed for farming and there can be seen higher unemployment conditions in off-season of planting and harvesting.

5.7 CATTLE

Horse is used as transportation tools instead of cars. Especially in Bone and Wajo with bad road conditions, horses are indispensable tools for transportation in not only dry season but also wet season. In Soppeng and Sidrap, road is well arranged, and jeep and cars are main transportation tools instead of horses.

Cattles for supply of protein -- cow, goat, chicken and duck -- are produced intensively in Bone. Buffaloo are used for farming. There are clear correlationship between the number of Bufallo and planted area of wet season paddy. (Table 5.6)

5.8 FISHERIES

Of the total production of fish (189,000 t, in 1977), 77% comes from marine fisheries, and 23% is dependent upon inland fisheries. Fish production from lake, paddy area and swamp is about 20,000 tons (10% of total fish production of South Sulawesi). Fish production from Lake Tempe is about 70% of total fresh water fish. It means that 7% of total fish production of South Sulawesi comes from Lake Tempe. (Table 5.7)

70% of total fish production in Wajo was supplied from Lake Tempe in 1977. For Wajo, maintenance of fish resources from Lake Tempe and increase of its production are important issues.

Fishermen's households of Wajo, who are engaged in fishing of Lake Tempe in 1977, are 3,200 and family members are estimated about 16,000. Total fishermen's households being engaged in lake fishing become 4,400 including Soppeng, 22,000 persons are family members of fishermen. (Table 5.9)

Labor productivity of inland fisheries is very low compared with that of marine fisheries. (Table 5.10)

Labor productivity of inland fisheries -- 1.5 t/fisherman
Labor productivity of marine fisheries -- 5.7 t/fisherman

Development strategy of inland fisheries in Lake Tempe must be for the improvement of living standard of 20,000 fishermen's families who engaged in lake fishing, and the improvement of nutritious conditions of consumers in the objective area.

5.9 MANPOWER

Distribution of population density in South Sulawesi has following characteristics. (Table 5.11)

(1) North part of this province -- Low population density area

(2) Central part of this province -- Medium population density area

(3) South part of this province -- High population density area

Among provinces, in the north part of this province -- Mamuju and Luwu, the population density is too low. In Mamuju it's about 7 persons/km^2 and in Luwu, about 17 persons/km^2 in 1976.

On central part, population density is 152 persons/km^2 in Wajo, 129 persons/km^2 in Bone, 157 persons/km^2 in Soppeng and 82 persons/km^2 in Sidrap. (Fig. 2.2)

In the south part, there are 4 Kabupatens with more than 200 persons/km^2 along the south coast of this province.

From the viewpoint of acquisition of manpower, North part of this province, including Luwu and Mamuju with transmigration projects, is the most suitable place to accept new inhabitants from outside of these areas.

For the other areas of this province, resettlement program within the province is required for the equalization of distribution of manpower.

5.10 BALANCE OF SUPPLY AND DEMAND OF RICE

Per capita production of paddy is 360 kg/person in South Sulawesi in 1977. In Sidrap it's about 1,350 kg/person, because of the success of Sadang project. This Kabupaten has much surplus of rice and makes a role as a rice supply centre (Table 5.12),

Sidrap	: 1,350 kg/person
Soppeng	: 530 kg/person
Bone	: 260 kg/person
Wajo	: 230 kg/person
South Sulawesi	: 360 kg/person.

Balance of supply and demand of rice is as follows. 180,000 tons of rice are quantities of surplus rice of South Sulawesi in 1977. 76,000 tons of this surplus rice were exported to the outside region of this province. In 1976, 71,000 tons were consumed for interinsular trade from this province.

Total quantities of surplus rice in 4 Kabupatens are about 110,000 tons -- 60% of total surplus of this province in 1976. Kabupaten Sidrap has raised 60% of surplus rice in South Sulawesi.

5.11 TRADE AND MARKETING OF RICE

Trade and marketing system, of rice from producers to final consumers, is divided into 3 patterns. (Fig. 5.7)

(1) Farmers to Local Consumers (within Kabupaten = Rural area)

This channel includes self-consumption of farmers and the rout first from farmer to retailers or small scale collectors and then to final local consumers.

According to the estimation in 1976, 736,000 tons of total rice supply in South Sulawesi are treated through this channel.

P = Total population of South Sulawesi = 5,573 x 1,000 persons

Yp = Total paddy production of S.S. = 1,834 x 1,000 tons

Yr = Supply of Rice = 917 x 1,000 tons
(Yr = 0.5 Yp)

D = Quantities Demanded of Rice

i) For local consumption (DI) = 736 x 1,000 tons
(Kabupaten = Urban Area)

ii) For regional consumption (Du) = 80 x 1,000 tons
(Kotamadya = Urban Area)

iii) Total (D) = 816 x 1,000 tons

per capita consumption

i) for local people = 150 kg of rice/person year

ii) for regional people = 120 kg of rice/person year

Sr = Surplus of rice = Yr - D = 917 - 816 = 101 tons

(2) Farmers to Regional Consumers (Kotamadya = Urban Area)

Government purchases rice from farmers with floor price through BUUD and DOLOG. Stored rice through this rout is supplied to free market in taking consideration the balance of supply and demand. And also private collectors buy rice from farmers and transport to large regional market -- Kota Ujung Pandang. Two routs are normally prosperous for this trade and marketing system.

In 1976, quantities of rice treated in the first rout -- (farmers -- BUUD -- DOLOG -- Regional market) are 82,000 tons and in the second route, 69,000 tons were treated through this system. 80,000 tons were consumed in the regional market and estimated 71,000 tons in 1976, were exported to the external area of South Sulawesi.

(3) Farmer to Interinsular Trade

Marketing system is in the same route of (2). Almost all quantities of rice for interinsular trade are brought to Pare-Pare port. It becomes 71,000 tons in 1976.

150,000 tons of rice are treated in a large scale marketing system through BUUD-DOLOG and big private collectors for the supply to regional market and interinsular trade.

In Sidrap surplus rice is transported only to Pare-Pare for interinsular trade. But in Soppeng the quantities of rice treated through DOLOG are almost brought into Ujung Pandang, and those through collectors are transfered to Pare-Pare for interinsular trade. Bone and Wajo have no surplus of rice.

5.12 FLUCTUATION OF RICE PRICE (IN UJUNG PANDANG)

In 1970 and 1971, monthly fluctuation of rice price is not so strong and stable in a whole year. In 1972, rice production decreased because of heavy drought damage. As a result of this, rice price has increased so much in harvested season of wet season paddy. In 1975, rice production was very high and therefore rice price extremely fell down. For the stabilization of rice price, production must be in a stable conditions and in harvesting period, BUUD-DOLOG must have more price control function.

5.13 INDUSTRIES

(1) Rice Mill

Among 4 Kabupatens, average scale of rice mill is the biggest in Sidrap. And also in Bone, its scale is very large compared with other 2 Kabupatens. In Sidrap and Bone, rice production is not only large but also is raised in a limited area. In these two Kabupatens, rice is produced intensivelly in a limited rice producing centre.

Therefore, there is a possibility for the large scale rice mill units to be introduced. In Soppeng, rice production is devided into two seasons (Table 5.13) and total yearly products are not so high compared with Sidrap. Accordingly small scale rice mill units are enough to treat produced paddy. Especially in Wajo, total production is not so high and dispersed in wide rainfed area. Therefore, many small scale rice mills are established in each Kecamatan.

(2) Other Industries

In South Sulawesi, there are 2,526 units of small scale industries, 100 units of medium scale industries and 14 units of large scale industries. Especially, food manufactures including rice mill are most prosperous industries in South Sulawesi. And wood products and paper industries are also main industries.

In 4 Kabupatens, total number of industrial units are 1,042, about 70% of these units are located in Wajo. 74% of total units of Wajo are rice mills. And many small scale textile and wood products units are in Wajo.

Sengkang, the central town of Wajo, has very few job opportunity in agricultural production. There are many retailers, collectors of rice and fish and, laborers who are engaged in small scale industries. It is important for these small scale units to be centralized into a large scale unit in order to get more income.

5.14 TRANSPORTATION

Main roads are in good conditions in Sidrap and Soppeng.

Access roads to the main roads -- national and provincial roads -- are also well especially in dry season. In these two Kabupatens, there are no "constraints" for the transportation of rice and inputs for rice production. However, in wet season, some access roads become muddy.

In Wajo, provincial roads are comparatively in good conditions. But, at present, rice production center is far from the main roads and access roads to the main roads are the muddy road.

Car cannot pass after the heavy rainfall, because of the muddy conditions of road. Accordingly, people use two routs to big local markets (Sengkang and the other central markets). One is "north rout" from rice production center to north provincial road and the other is the way from the rice production area to the South Sulawesi provincial road after crossing Cenranae river.

Bone is in the worst road conditions in these 4 Kabupatens. And rice producing area is far from Ujung Pandang and Pare-Pare. It happens that some parts of this Kabupaten are isolated from rice consumption Center. Especially in the south part of Bone, road and bridge for transportation are inevitably damaged. In south of Bone, there is one of the worst provincial roads of South Sulawesi, passing from Sinjai to Ujung Lamuru. In this provincial road, almost all bridges are broken and road is muddy. In this road, even if in dry season, only jeeps can pass crossing the rivers, but trucks cannot pass easily.

In wet season, transportation tools of this area are only horses and isolated from big local market.

CHAPTER VI MICRO ECONOMIC ANALYSIS

6.1 LOCATION

The objective area of the Central South Sulawesi Water Resources Development Project, is located in the central part of this province.

Sengkang, central town of the objective area is connected with Ujung Pandang and Pare-Pare by the provincial road. The total length of road from Ujung Pandang to Sengkang is about 250 km and, from Pare-Pare to Sengkang, is 90 km. It takes about 5 hours by car from Ujung Pandang and 2.5 hours from Pare-Pare.

6.2 OBJECTIVE AREA

Number of Kecamatan is as follows;

	Objective Area	Others	Total
Wajo	9	1	10
Bone	11	10	21
Soppeng	5	0	5
Sidrap	4	3	7
Total	29	14	43

Name of Kecamatan and their locations are shown in the following table.

Kabupaten		Kecamatan	Kabupaten		Kecamatan
1. Wajo	101	Tempe	2. Bone	213	Lappa Riaja
	102	Belawa		214	Lamuru
	103	Tanasitolo		215	Mare
	104	Majauleng		216	Libureng
	105	Pammana		217	Tonra
	106	Sabbangparu		218	Bontocani
	107	Maningpajo		219	Kahu
	108	Pitumpanua		220	Salomekko
	109	Sajoanging		221	Kajuara
	110	Takkalala			
			3. Soppeng	301	Lalabata
2. Bone	201	Tanete Riatang		302	Mario Riawa
	202	Barebbo		303	Lili Rilau
	203	Palakka		304	Lili Riaja
	204	Awangpone		305	Mario Riwawo
	205	Sibulue			
	206	Cina	4. Sidrap	401	Maritengngae
	207	Ponre		402	Panca Lautang
	208	Ulaweng		403	Tellu Limpue
	209	Tellusiatinge		404	Watangpulu
	210	Ajangale		405	Baranti
	211	Dua Boccoe		406	Pancarijang
	212	Cenrana		407	Dua Pitue

Included in the Objective Area

6.3 POPULATION, AREA AND POPULATION DENSITY

6.3.1 Population

In the objective area of this project, total population is about $1,056 \times 10^3$. And the total area is 8,472 km^2 -- total area of 29 Kecamatan. In Wajo and Bone -- depressed area from economic point of view -- there is 65% of its total population. And in Soppeng and Sidrap -- developed area -- 35% of the total population lives with better conditions of rice production. Distribution of population in the objective area is as follows; (Table 6.1)

(1) Population is the largest in Lalabata with Watansoppeng among all of Kecamatan of this objective area.

(2) Majority of the population is around Watansoppeng, along the provincial road from Sengkang to Ujung Pandang, along the Cenranae River, around Watanpone, and Kecamatan Dua Pitue along Bila and Boya river.

(3) Southern part of Bone is in the area, where there are the smallest number of inhabitants of this objective area.

(4) There are many fishermen's families in Kecamatan Tempe and Sabbangparu around Tempe lake.

(5) Soppeng is abundant in the agricultural production, transportation facilities including road and bridge, and convenient for the access to Ujung Pandang. Accordingly, each Kecamatan is in good conditions to live and population is concentrated not only in Watansoppeng but also along the road from Sengkang to Ujung Pandang.

(6) Population is very large in Kecamatan Dua Pitue of Sidrap. In this Kecamatan, almost all people live along the Bila and Boya river, and along the road from Sengkang to Pangkajene. Within Sadang project area, population is not so high.

6.3.2 Population Density

(1) Population density is especially the highest in Tanete Riatang including Watanpone in Bone, and Kecamatan Tempe with Sengkang in Wajo. Population density is 1,200 persons/km^2 in Kec. Tempe. As above mentioned Watanpone is a commercial centre surrounded by rice production centre of Bone, and Kecamatan Tempe and Sabbangparu have many fishermen connected to Tempe lake. (Table 6.1)

(2) These two towns have the highest population density because of the centre of the local market, and also Watanpone is the base for interinsular trade to Southeast Sulawesi. Kecamatan Tempe and Sabbangparu are the underdeveloped area without satisfactory employment opportunity. Majority of the people continue to be a poor fishermen around Tempe lake. Head of Kecamatan Tempe tried to give new employment opportunities outside of this Kecamatan for fishermen but they refused to change their present situations. This result comes from the difference of traditional customs and the difference of working method, between agriculture and fisheries.

(3) For Kecamatan Tempe. most important issue is to grow new employment opportunity, especially for many poor fishermen. For this purpose, increase of the production of fish from Tempe lake and improvement of the method of income distributions among fishermen and collectors are important. Otherwise, new employment opportunity in agricultural sector must be kept for them, by the extension of newly irrigated area, or its opportunity must be increased in industrial activities through the expansion of the electric power supply.

(4) Densely populated area is along the road from Watanpone to Parepare. It means that centers of economic and social activities are concentrated along the road between Watanpone and Parepare, Improvement of Trade and Marketing system, and transportation system must be done along this commercial belt.

6.4 AGRICULTURE

6.4.1 Production of Wet Season Paddy

(1) Wajo ..... Paddy production centre is located in the eastern part of this Kabupaten. These are Kecamatan Sajoanging and Takkalala. (Table 6.2)

(a) Sajoanging ..... 20,000 t (in 1977)
(b) Takkalala 23,000

(2) Bone ..... Around Watampone, rice production is the highest in Bone.

(a) Barebbo ..... 17,000 t (in 1977)
(b) Sibulue 15,000
(c) Cina 12,000
(d) Awangpone 14,000

(3) Soppeng ..... Lalabata and Lili Riaja are the centre of paddy production in Soppeng.

(a) Lalabata ..... 26,000 t (in 1977)
(b) Lili Riaja 24,000

(4) Sidrap ..... Maritengngae with Sadang Project of PROSIDA and Dua Pitue have the highest production of paddy in this Kabupaten.

(a) Maritengngae ... 36,000 t (in 1977)
(b) Dua Pitue 44,000

Dua Pitue is the highest paddy production area of the objective 4 Kab. -- Kabupaten Wajo, Bone, Soppeng and Sidrap, because of the good irrigation conditions by the implementation of intake -- Bulu Cenrana.

(5) Around Tempe lake, paddy production is very low because of the bad irrigation and drainage conditions.

(6) South part of Bone and the area along the Cenranae river in Bone are the lowest paddy production area in 4 Kab.

(7) Stable production of wet season paddy on the fluctuation of the paddy production during 1975 and 1977, stable

production, in Maritengngae and Dua Pitue of Sidrap, and Lalabata and Lili Riaja of Soppeng, can be seen. In Wajo and Bone, paddy production has decreased since 1975. But only Sajoanging and Takkalala of Wajo continue to keep their high production among these depressed Kabupatens from 1975 to 1977. South of Bone is in the lowest paddy production area both in 1975 and 1977. This area must be improved the irrigation and agricultural technology from the viewpoint of reequalization of income distribution.

6.4.2 Production of Dry Season Paddy

(1) Present paddy production in dry season, is limited in Sidrap and Soppeng of the objective area. In the other two Kab. -- Wajo and Bone, paddy production area in this season is extremely small.

(2) In Sidrap and Soppeng, production centres of paddy in dry season, are the higher production area of wet season paddy. (Table 6.3)

(a) Sidrap
Maritangngae ..... 51,000 t (in 1977)
Dua Pitue 26,000

(b) Soppeng
Lalabata ..... 20,000 t (in 1977)
Lili Riaja 26,000

(3) In Maritangngae, quantities of paddy products of dry season are almost the same as those of the wet season paddy, because of the implementation of PROSIDA.

(4) Dua Pitue has less production of paddy in dry season than in wet season.

60% of wet season paddy's production
= production of dry season paddy

Dua Pitue is worse conditions of irrigation facilities than Maritangngae. Therefore, the production of dry season paddy in Dua Pitue has not so strikingly succeeded different from Maritangngae.

(5) In Soppeng, paddy production both in dry and wet season is almost the same, because of the abandant natural water resources.

(6) Most important issue is to improve the irrigation facilities especially in Wajo and Bone. And also improvement of present irrigation system of Soppeng and Sidrap must be improved in more effective utilization of water for the success of dry season paddy.

6.4.3 Productivity of Wet Season Paddy

(1) In Soppeng and Sidrap, paddy productivity per ha of harvested area is very high -- more than 3.5 tons per ha in 1976-1977.

(2) In Wajo and Bone, all Kecamatans produce paddy with lower productivity, less than 3.5 tons per ha in 1977.

(3) Kecamatans, with the highest productivity of wet season paddy in 1977, are Maritengngae, Tellulimpue and Dua Pitue in Sidrap. And also in Lalabata, Lili Riaja and Mario Riwawo of Soppeng, productivity of wet season paddy is strikingly high in 1976.

(a)	Maritengngae	4.1 t/ha	(1976)
(b)	Tellulimpue	4.0 t/ha	
(c)	Dua Pitue	4.2 t/ha	
(d)	Lalabata	4.8 t/ha	(1977)
(e)	Lili Riaja	4.3 t/ha	
(f)	Mario Riwawo	4.0 t/ha	

(4) Productivity of wet season paddy is extremely low in the north part of Bone along Cenranae river and in the south part of Bone. Almost all Kecamatans in Wajo have lower productivity than 3.0 tons/ha in 1977.

(5) Around Lake Tempe, productivity of paddy is low in the east compared with that of west part.

(6) Fluctuation of paddy productivity in wet season
In wet season, Maritengngae and Tellulimpue of Sidrap constantly increase production. Dua Pitue, Lalabata, Lili Riaja and Mario Riwawo also succeed higher productivity of paddy but the productivity is not stable annually. Three Kecamatans of Sidrap, Maritengngae, Tellulumpue and Dua Pitue increase every year paddy productivity. But in 3 Kecamatans of Soppeng increase of paddy productivity is not in the constant way. Almost all Kecamatans of Wajo and Bone, are decreasing in their productivity of paddy. Fluctuation of paddy productivity in wet season is shown in following table.

(Unit: t/ha)

Kabupaten	Kecamatan	1973	1974	1975	1976	1977
Sidrap	Maritengngae	2.4	3.2	3.7	4.1	-
	Tellulimpue	2.9	3.4	3.3	4.0	-
	Dua Pitue	1.3	3.7	3.0	4.2	-
Soppeng	Lalabata	-	2.5	3.9	3.6	4.8
	Lili Riaja	-	2.4	3.3	5.0	4.3
	Mario Riwawo	-	2.3	3.6	2.7	4.0

Kabupaten	Kecamatan	1973/ 1974	1974/ 1975	1975/ 1976	1976/ 1977	1977/ 1978
Sidrap	Maritengngae	2.0	3.7	4.3	5.9	-
	Tellulimpue	1.8	2.6	3.4	5.0	-
	Dua Pitue	3.1	3.8	5.1	5.3	-
Soppeng	Lalabata	4.3	3.2	3.7	4.4	-
	Lili Riaja	4.1	5.3	4.4	5.1	-
	Mario Riwawo	2.0	5.2	3.4	4.4	-

Source: From the Agricultural office of Each Kab.

6.4.4 Demages for Wet Season Paddy

(1) Around Lake Tempe and in the south part of Bone, damage for the wet season paddy is very high. Especially in Tanasitolo, its damage is very high, through flood and drought.

(2) In, Wajo, almost all Kecamatans (excluding Kecamatan Tempe) were damaged in paddy production of wet season. Around Lake Tempe, flood and drought damages are strikingly high. In east part of Wajo, damages are mainly caused of drought and insects.

(3) In the north part of Bone, along the Cenranae river damage through drought is not able to be avoided for wet season paddy.

(4) In the south part of Bone, insect is the main cause of damage for wet season paddy.

6.4.5 Farm Income

According to the analysis in agricultural sector, average gross farm income of 4 Kabupatens: Wajo, Bone, Sidrap and Soppeng is about Rp.242,000 and net farm income is Rp.159,000.

The objective area, as mentioned before, is divided into two groups -- advanced area and depressed area, Wajo and Bone are underdeveloped area from economic point of view. On the other hand, Sidrap and Soppeng have highly improved their economic conditions due to the effective water use for paddy production.

As for the regional gap of present farm income, following aspects are strengthened.

Maritengngae and Dua Pitue of Kabupaten Sidrap are the most advanced area of the objective area. Maritengngae is a part of Sadang irrigation project area and Dua Pitue is supplied much irrigation water through intake of Bulu Cenrana in Boya river. Therefore farmers of these two Kecamatan can produce paddy not only in wet season but also in dry season, and get much income from harvesting a plenty of paddy products.

In Soppeng, Lili Riaja succeeds also the highest net income in this objective area, more than Rp.300,000 per farm household. Farmers of this Kecamatan can utilize the abandant water resources through rainfall both in wet and dry season without technical irrigation facilities. Owing to effective water supply by this natural rainfall, they can produce paddy twice a year and bring much farm income for the improvement of their living standards.

On the other hand, southern part of this objective area, the area along Cenranae river and the area around Lake Tempe (excluding western part of this area) are highly depressed their economic conditions. Net farm income of some Kecamatan is only less than Rp.100,000. Farmers of these Kecamatans have kept their life with the works other than paddy production. In Wajo -- depressed Kabupaten, Kecamatan Sajoanging and Takkalala are not in a lower economic standard because of the highest paddy production in wet season.

As a result of this analysis, expansion of paddy production area and increasing of paddy productivity through the development of water resources are indispensable not only for the economic growth of the objective area, but also for the improvement of living standards of individual farmers.

6.5 MANPOWER AND OTHER ECONOMIC CONDITIONS

6.5.1 Manpower

Population per Ha of planted and harvested area of wet season paddy (P/Pa, P/Ha) shows the availability and potentiality of manpower for the use of paddy production in planting and harvesting period.

M1 = P/PA, M2 = P/HA

(1) Area with highest M1 (M. ≧ 60)

Kecamatan Tempe with Sengkang is of highest ratio, M1 = 430 persons per PA. Sengkang is the central town of Kab. Wajo. However, employment opportunity in tertiary industry and also small scale manufactures is very few. Their living standard is very low compared with Watampone and Watansoppeng, where economic activities are comparatively prosperous. For the people of this Kecamatan, new job opportunity must be prepared. Some policy of resettlement of the people in this Kecamatan to the other area must be needed. For this purpose, decision makers must take into consideration of the traditional custom and the different social system by jobs. In case of the resettlement project for these people, project assessment must be prepared considerably on the social aspects.

(2) Area with higher M1 (20 ≦ M1 < 60)

In the central part of Bone and south of Soppeng there are Kecamatans with higher M1. Tanete Riatang has a trade and marketing centre - Watampone - to all of Bone and has a port, Bajoe is located in a convenient place for interinsular trade to South-East Sulawesi, where rice is deficit. This Kecamatan is developed in economic activities. This Kecamatan is developed in economic activities, including abundant marine fish resources. The other three Kecamatans, Lamuru, Ulaweng and Mario Riwawo are producing small quantities of rice. Their job opportunity must be in agricultural production other than paddy. For these people more job opportunity must be created.

(3) Area with high M1 (10 ≦ M1 < 20)

Along Cenranae river, M1 is comparatively high. Effective use of manpower within Kecamatan must be considered with the effect by the introducing of new agricultural technology.

(4) Area with low M1 (5 ≦ M1 < 10)

In Wajo, Tanasitolo and Belawa are classified in this group. In Soppeng, Lili Riaja and Mario Riwawo are in this class. In the south of Soppeng and Sidrap excluding Dua Pitue. M1 is around 8. Sadang Project is included in these Kecamatans. In Wajo and Bone, these areas are not well in living conditions, because of the lower and unstable agricultural production, therefore M1 is too small. On the other hand, latter areas in Soppeng and Sidrap, the job opportunity for the local inhabitants is very high, because of the developed paddy production. These two groups have different phenomena in job opportunity.

(5) Area with the lowest M1 (M1 < 5)

North part of Bila and Boya area in Dua Pitue, Maritengngae under PROSIDA, east part of Bone, and east north of Wajo with

Gilirang project have the lowest manpower -- 3 to 5 persons per planted area of wet season paddy. These areas are highly developed area in rice production. At present, manpower is used completely in effective way for wet season paddy production.

(6) M2 (Population per ha of harvested area of wet season paddy)

The highest M2 is shown in Kecamatan Tempe with more than 400 persons per ha. M2 is higher, but also around Lake Tempe along Cenranae river and in the south of Bone.

6.5.2 Other Economic Conditions

(1) Supply and Demand of Rice

(a) Per capita production of paddy -- Y -- shows the potentiality for self consumption and supply of surplus rice to rice deficit areas. Kecamatan Maritengngae, Dua Pitue and Lili Riaja has the highest potentiality for supply of surplus rice to the other area. And the other higher rice surplus area is the same as rice production centre, where paddy production is the highest in Wajo, Bone, Soppeng and Sidrap. In Maritengngae, Dua Pitue and Lili Riaja, -- Y -- is more than 1,000 kg/person of paddy.

(b) In east part of the area around Lake Tempe and the area along Cenranae river in Bone, self-sufficiency ratio of paddy is too low. It is approximately 100 - 200 kg/person of paddy.

(c) Quantities of Surplus Rice
Per capita consumption of rice is 120 kg/person per year in case 2. 120 kg/person is the actual average value of consumption in whole South Sulawesi in 1975 and 150 kg/person is the estimated value in Wajo and Soppeng by the field interview survey of this project. According to the estimation of rice surplus, the highest surplus area is located in the western part of Sidrap and Soppeng. This area is the rice supply centre for interinsular trade through Parepare and also to the biggest regional market in South Sulawesi -- Ujung Pandang. In case 2, the highest paddy supply centre, Maritengngae has the surplus paddy of 78,000 t and in Dua Pitue, it is about 58,000 t in 1977. Lalabata and Lili Riaja have about 30,000 t~40,000 t of surplus paddy. On the other hand along Cenranae river and Lake Tempe 7 Kecamatans belong in the area with deficit of 5,000 to 10,000 tons of paddy.

(2) Transportation

(a) Along the west coast of South Sulawesi, there is the national road from Ujung Pandang to Parepare, People in Ujung Pandang can reach the area around Lake Tempe through two ways. One way is by this national road in the mountainous place. It takes about 4 or 5 hours by car from Ujung Pandang to Sengkang besides Lake Tempe using these two ways. The length from Ujung Pandang to Sengkang is about 200 to 250 km and the average velocity for this road is 45 km/h.

(b) Some of the objective area is concentrated around Lake Tempe. Lake Tempe and Sidenreng are surrounded by "Ring Road" -- Sengkang -- Watan Soppeng -- Pangkajene -- Sengkang. These three towns are the political and economic centres of three Kabupatens -- Wajo, Soppeng, Sidrap.

(c) The road from Ujung Lamuru to Sinjai is one of the worst road in South Sulawesi, Almost all bridges on this road are broken, and therefore cars must cross the river without bridge every 5 or 10 minutes.

(d) From Sengkang to Watampone, road conditions are not so well because of gravel road without asphalt. Also the road in the west side of Lake Tempe, roads are damaged without asphalt. However, these roads can be passed by cars in a whole year. Provincial road, for Ujung Pandang to Sinjai, is impossible for the cars to pass in the high water level of many small rivers after heavy rainfall.

(e) Access roads to provincial road are Kabupaten and Desa roads. It very often happens, surplus of agricultural products in the south of Bone can be carried by horses from this area to Tanabatue along the provincial road from Ujung Lamuru to Ujung Pandang.

(f) By time and length from each Kecamatan to Ujung Pandang or Parepare, Mario Riwawo is the closest to Ujung Pandang in the objective area -- 3.5 hours by car or 140 km. Takkalala and Sajoanging are about 250 km from Ujung Pandang and it takes about 6 hours from here to Ujung Pandang. Libureng is located in 140 km and Kahu in 180 from Ujung Pandang, but the average velocity from these Kecamatans to Ujung Pandang is 35 km/h.

(g) Accessibility to big market
Excluding south of Bone, all project area is nearer to Parepare than Ujung Pandang. It means that, in future, Parepare will be more important trade and marketing centre, including interinsular trade, for the objective

area of irrigation. South part of Bone is in a inferior condition for the accessibilities to big market, even if to big local markets -- Sengkang, Watampone, Pangkajene and Watansoppeng.

CHAPTER VII FORECASTING OF DEMAND AND SUPPLY

7.1 RICE

Main role of the irrigation plan is to strengthen the role as a rice supply centre for the east part of Indonesia and to improve farmer's income of the objective area.

According to the forecasting of rice demand and supply, 240,000 tons will be short for the self sufficiency within the command area of South Sulawesi DOLOG in the year of 2000.

70% of total production in command area is produced in South Sulawesi. In South Sulawesi, rice surplus conditions will continue even if in 2000. Quantities of surplus rice will be 1,129,000 tons in this province. However, serious rice deficit occurs in the other area within the command area, and therefore rice production without the "project" is not enough for the requirement of rice in the east part of Indonesia.

7.2 FISH

7.2.1 Forecasting of Population

(1) Population Increase Ratio

Average annual increase ratio of population is estimated in a following way. (Table 7.1)

(a) For 4 Kabupatens
During 1971 and 1977, average annual increase ratio of population is 2.0%.

(b) For South Sulawesi
During 1971 and 1977, average annual increase ratio of population is 1.6% and 2.6% in 1975 to 1977. It seems that the other area of 4 Kabupatens is absorbing manpower because of the improvement of employment opportunity in urban area or the depressed conditions of the objective 4 Kabupaten. If, in future, inhabitants of objective area succeeds to get more income through the implementation of proposed project, people don't want to look for the new employment opportunity in urban area. With "project", annual population increase ratio will be 2.0% both in the objective 4 Kabupaten and the other area.

(c) The value, 2.0%, is the same as planned increase ratio of whole Indonesia in PELITA III.

(2) Forecasting of population

Annual population increase is set in 2.0% according to the trend in recent years and planned value in P. III.

Forecasting of future population is shown in the following table. In objective area, total population will reach 1,580,000 in a target year -- 2000.

Forecasting of Population
in the Objective 4 Kabupatens

(Unit: 1,000)

Area	1980	1985	1990	1995	2000
Objective Area	1,063	1,174	1,296	1,431	1,580
Other Area	455	503	556	613	677
Total	1,518	1,677	1,852	2,044	2,257

(1) Objective 4 Kab.: Wajo, Bone, Soppeng and Sidrap

(2) Objective Area : Area within the objective area of the Central South Sulawesi Water Resources Development Project (29 Kecamatan)

(3) Annual increase ratio of population: 2.0%

7.2.2 Per Capita Consumption

Fish production in South Sulawesi has highly increased in these years. And per capita consumption has also increased year by year. In 1971, per capita consumption is 24.0 kg and in 1977, it became 33.0 kg. (Table 7.2)

In this forecasting, 30 kg of annual fish consumption is in use.

7.2.3 Forecasting of Demand

Fish demanded in South Sulawesi is 270,000 tons in 2000 and 68,000 tons in the objective area. (Table 7.3)

7.2.4 Forecasting of Fish Production and Balance

Marine fish production increased with 7% to 14% of annual increase ratio. Therefore, fish is not deficit in whole South Sulawesi.

In the objective area, assuming that supply from marine fisheries has been kept in constant ratio to total demand or constant amount of present level, following results are estimated. (Table 7.4 and 7.5)

(a) Minimum amount (40% of demand is supplied from the inland fisheries) of objective area -- 5,000 tons of fish are required to be increased by the project.

(b) Maximum amount (to keep present supply from external source in the present level --- 18 x 10^3 t in 1977).

15,000 tons are needed to be increased through the implementation of the inland fisheries development project.

As a result of this forecasting, target production of fish by the project is 10,000 tons in the year of 2000.

7.3 HYDRO POWER

7.3.1 Needs for the Hydropower Development

The hydropower development plant of the objective area has two kinds of purposes.

(a) Power supply for the development of small sale industries in the objective area -- Kab. Wajo, Bone, Soppeng and Sidrap.

(b) Power supply to the highly developed area along the western coast of South Sulawesi provinces as a supporting project to Bakaru electric power project.

For this purpose, following demand and supply analysis is prepared from the regional development point of view.

(1) Energy balance in South Sulawesi

Owing to the power supply of this big project, power supply is enough for the power demanded, which increases with the growth of economic development. In 2000, power supply cannot follow to the higher economic development. (Table 7.6, 7.7 and 7.8)

During 20 years from now on, power supply with Bakaru project is balanced with the power demanded. However, the power project planned in the objective area has a function as a supporting project, while Bakaru power project is not operated in full capacity.

(2) Energy Balance in our objective area

In South Sulawesi, 96% of total numbers of manufacturing establishments is small scale industry. In 1974/75, number of small scale industries is 2526. Among these industries, 38% is rice mill.

In our objective area -- central South Sulawesi -- nearly 100% of manufacture is small scale industry. Total number of manufacturing establishments is 1,036.

Wajo	713	(69)
Bone	168	(16)
Soppeng	79	(8)
Sidrap	76	(7)
Total	1,036	(100)

In the objective area, there are two central towns -- Sengkang of Kab. Wajo and Watansoppeng in Kab. Soppeng. Sengkang has a function not only as a trade centre but also as a industrialized area with small scale industries -- food relating industries, textile and furniture industries.

Functions and characteristics of Sengkang, Watansoppeng and the other area are shown in the following table;

Zone	Population	Economic Activities		
		Agriculture	Trade	Industry
1. Sengkang	45,000*	●	●	●
2. Watan Soppeng	64,000*	●	●	●
3. Other Area	947,000	●	●	●
Objective Area	1,056,000	●	●	●

(*) Population

a. Sengkang : Total population of Kec. Tempe
b. Watansoppeng : Total population of Kec. Lalabata

Per capita (annual) energy consumption of Ujung Pandang, Parepare, Sengkang and Watansoppeng are in the following levels. (Table 7.9)

Ujung Pandang	.....	466 kWh
Parepare	.....	117
Sengkang	.....	26
Watansoppeng	.....	10

Source: From Branch office of PLN in South Sulawesi, 1978

This value represents the economic growth level, especially degree of industrialization.

Ujung Pandang is the trade and industrial centre of South Sulawesi. Trade activities are prosperous in Parepare mainly for the interinsular trade of rice. On the other hand, Sengkang and Watansoppeng are extremely in a lower level of trade activities and industrial works without consuming much energy.

In future, large scale industries have few potentiality to be established in the objective area. However, regional income of the objective area will comparatively increase, being benefited from the implementation of the planned project. According to this assumption, Sengkang and Soppeng will grow the per capita energy consumption paralleled with the increase ratio of whole South Sulawesi.

The balance of energy demand and supply is forecasted for the objective area as shown in Table 7.10. As a result of the forecasting, energy demand is about 70,000 MWh in 2000.

7.4 URBAN DRINKING WATER SUPPLY

The needs of urban drinking water supply in the objective area will be focused mainly for the towns of Sengkang and Watansoppeng in the first place. Their demands in the target year of 2000 AD are estimated at about 1,100,000 m^3/yr as follows;

	Unit	Sengkang (Kec. Tempe)	Watansoppeng (Kec. Lalabata)	
Population in 2000	person	67,000	96,000	/1
Estimation of served population	person	16,000	14,000	/2
Daily demand	l/day	1,600,000	1,400,000	/3
Annual demand	m^3/yr	584,000	511,000	
		(Sum = 1,095,000)		

The estimated demand is not a significant magnitude compared with the total runoff of the rivers in the objective area, however, the further groundwater development study will be necessary to meet the above-mentioned urban drinking water demand as the result of the water quality analyses show relatively high value of organic solid and nitrogen total in many places. /4

/1: Refer to Table 7.10.

/2: Estimation considering the areas of Kec. Tempe (Sengkang) of 38 km^2 and Kec. Lalabata (Watansoppeng) of 400 km^2.

/3: Estimated per capita demand 50 l/day (cf. per capita supply in 1978 are 100 l/day for Ujung Pandang and 10 l/day for whole South Sulawesi).

/4: Refer to PART ONE HYDROLOGY.

CHAPTER VIII OVERALL DEVELOPMENT PLAN

8.1 GENERAL

The river basin in the objective area has big land and water resources. In spite of such high potential, their utilization is low at present. Irrigated paddy field are estimated at only 23% of total paddy field and the remaining are under rainfed of which fact has forced to limit realizing full exploitation of agricultural potentiality in the area. Further due to no flood measures, some areas undergo flooding which becomes one of the limiting factors for agricultural development as well as raising public welfare. With regard to potentiality of inland fisheries, lakes such as Tempe, Sidenreng and Buaya have still higher potentiality to increase much more fish production.

The government of Indonesia has made every effort to increase rice production in the period of PELITA II. However, demand of rice during the period has exceeded rice production so that huge amount of foreign exchange has been spent for importing rice. The government gave high priority to increase rice production for self-sufficiency in foodstuff in PELITA III, putting a stress on the higher economic growth and stabilization of socio-economic conditions.

The objective area is one of the main rice supply areas in Indonesia. The area has played an important base to supply rice to the area commanded by DOLOG of South Sulawesi province. It is considered from the result of demand-supply forecast for rice that the objective area will become more important key area on supply of rice for whole Indonesia including the area mentioned above.

The farmers in the objective area earn a livelihood mainly by farming activities of rice. However, due to low agricultural productivity, farm income is still low and net reserves of average farmer are negligible small.

Inland fish supply in the objective area does not meet demand at present. The shortage of the fish will be still continued in some extent, due to increasing growth rate of population.

Under such circumstances, master plan is formulated to carry out effective use of water resources and control floods for the purpose of raising economic development in national level and public welfare of people in the objective area.

For the formulation of the Master Plan, following planning procedure is applied as is shown in Fig. 8.1.

(1) Setting goals for the Project

According to the national economic development policy and the results of macro and micro socio-economic analysis, needs for the project are clarified (mentioned in Main Report, CHAPTER III). Based on the needs, development goals of this project are set for the preparation of strategy for regional development and sectoral development strategy. Development goals are summarized in 3.2 Socio-economy and Human Resources in Main Report, CHAPTER III.

(2) Sectoral development projects conceived

Alternative projects in the proposed sectors are conceived, from the viewpoint of effective water and land utilization and to meet socio-economic needs.

(a) Alternative projects of irrigation sector

(b) Alternative projects of flood control sector

(c) Alternative projects of inland fisheres development sector

(d) Alternative projects of multipurpose dam sector

(e) Alternative projects of hydro power sector

(3) Compound and multipurpose dam projects conceived

Taking into considerations of the relationship among sectoral development projects, individual projects must be reconsidered from the technological and economic point of view.

Resulting from this procedure, some sectoral projects will be integrated as compound or multipurpose projects.

(4) Economic evaluation for sectoral, compound and multipurpose dam projects

After the project conception of single, compound and multipurpose project, each project is evaluated from economic point of view, based on the following economic index.

(a) Net Present Worth (B - C)
Net Present Worth is calculated by present worth benefit (B) minus present worth cost (C) on the condition of that annual discount rate is applied 12.0%, with long term loan interest rate by the Central Bank of Indonesia. And project life for the evaluation is set 50 years after the beginning of construction. The conversions from Rupiah to US Dollar are made at the exchange rate of Rp.625 = US$1.

(b) Benefit - Cost Ratio (B/C)

(c) Internal Rate of Returns (IRR)

(5) Formulation of the proposed development projects in master plan

Based on the results of the economic evaluation of projects conceived, development projects in master plan are proposed.

(6) Formulation of stage plan for proposed development projects

The development schedule for proposed component projects is formulated basically based on the value of internal rate of return and further from the view point of project assessment.

The assessment method is applied, with careful approach including following matters.

(a) To set target year
Generally speaking, target years for the master plan are about 10 - 20 years, and economic project life is 20 to 30 years in the present economic development stage of Indonesia mentioned in Main Report CHAPTER III. From this view point, stage plan is prepared for 20 years.

(b) To set the beginning of the first priority project, detail design for the first project is started in 1980.

(c) To clarify the easiness and effectiveness from the view point of implementation.

-- To keep up with the planning period of the national Economic Plan and the related projects.

-- To meet the national goals, which are higher economic growth, social stabilization and equalization of social justice.

-- To consider technological and social constraints especially for maintenance of pumping station and resettlement of the inhabitants of multipurpose dam site.

-- To exclude difficulties of transportation for the construction materials and its constraints after the operation of project.

-- To take into consideration of the accessibility to the objective market.

8.2 SECTORAL DEVELOPMENT PROJECT

8.2.1 Sectoral Development Projects Conceived

(1) Kinds of sectoral projects conceived

Kinds of sectoral projects conceived are shown below;

(a) Irrigation project

- Bila Irrigation Project (10,500 ha)
- Boya Irrigation Project (10,000 ha)
- Langkemme Irrigation Project (5,000 ha)
- Lawo Irrigation Project (3,000 ha)
- Cenranae Irrigation Project (2,300 ha)
- Gilirang Irrigation Project (10,000 ha)
- Walanae Irrigation Project 1 (Mong Dam 1) (26,000 ha)
- Walanae Irrigation Project 2 (Mong Dam 2) (26,000 ha)
- Walanae Irrigation Project 3 (Walimpong Dam 1) (26,000 ha)
- Walanae Irrigation Project 4 (Walimpong Dam 2) (26,000 ha)
- Walanae Irrigation Project 5 (Walimpong Dam 3) (26,000 ha)
- Sanrego Irrigation Project (10,000 ha)
- Padangeng Irrigation Project (4,200 ha)

(b) Flood Control Project

- Bila Flood Control Project (without Bila and Boya Irrigation Projects)
- Bila Flood Control Project (with Bila and Boya Irrigation Projects)
- Walanae Flood Control Project 2 (Mong Dam 2)
- Walanae Flood Control Project 3 (Walimpong Dam 1)
- Walanae Flood Control Project 4 (Walimpong Dam 2)
- Walanae Flood Control Project 5 (Walimpong Dam 3)
- Walanae Flood Control Project without Walimpong Dam
- Cenranae Flood Control Project

(c) Hydropower Project

- Walanae Hydropower Project 1 (Mong Dam 1)
- Walanae Hydropower Project 2 (Mong Dam 2)
- Walanae Hydropower Project 3 (Walimpong Dam 1)
- Walanae Hydropower Project 4 (Walimpong Dam 2)
- Walanae Hydropower Project 5 (Walimpong Dam 3)

(d) Fisheries Development Project

(2) Location of the projects

The projects conceived are shown in Fig. 8.2.

8.2.2 Benefit, Construction Cost and O-M Cost of Each Sectoral Project Conceived

Benefit, construction cost and O-M cost of each sectoral project conceived are shown in Table 8.1.(1) - (2).

8.3 COMPOUND AND MULTIPURPOSE DAM PROJECT

8.3.1 Compound and Multipurpose Dam Projects Conceived

Compound and multipurpose dam projects will be formulated with integration of the sectoral development projects technically and economically.

(1) Compound project consisting of Bila irrigation project, Boya irrigation project and Bila flood control project is conceived to simultaneously solve constraints of shortage of irrigation water and flood damage in the northern area of Lake Tempe.

(2) Multipurpose dam project located in the middle reaches of the Walanae River, which comprises Walanae irrigation project, Walanae flood control project and hydropower project is conceived to utilize water resources effectively and control flood in the downstream in the Walanae River.

8.3.2 Benefit, Construction Cost and O-M Cost of Compound and Multipurpose Dam Projects

(1) Allocation method of multipurpose dam cost (construction cost and O-M cost) in each sectoral Walanae project

The multipurpose dam cost in each sectoral Walanae project is allocated by the rate of net benefit as shown in Table 8.2.

(2) Benefit, construction cost and O-M cost of compound and multipurpose dam project

Benefit, construction cost and O-M cost of compound and multipurpose dam projects are shown in Table 8.3.

8.4 ECONOMIC EVALUATION

8.4.1 General

Economic feasibility for the development projects is first evaluated by calculating the internal rate of return. Further benefit cost ratio and difference between benefit and cost are examined. The calculation is carried out on the basis described in 8.1.4.

8.4.2 Economic Evaluation of All the Projects Conceived

The estimated values of economic evaluation to all the projects conceived are shown in Table 8.4.

After examination of the economic evaluation, the economic feasibility of each component plan is clarified.

As far as irrigation projects are concerned, Sanrego Irrigation Project and Bila Irrigation Project rank first in terms of internal rate of return of all the irrigation projects, followed by the second group of Langkemme Irrigation Project, Lawo Irrigation Project, Cenranae Irrigation Project and Gilirang Irrigation Project. The remaining three projects; Boya Irrigation Project, Padangeng Irrigation Project and Walanae Irrigation Project rank third with low values of internal rate of return.

As regards flood control projects, Bila flood control project is the most effective plan in the objective area when the flood control project is implemented after completion of, or in parallel with, the Bila Irrigation Project and Boya Irrigation Project, followed by Cenranae Flood Control Project, Bila Flood Control Project without irrigation projects, Walanae Flood Control Project with Walimpong Dam and Walanae Flood Control Project without Walimpong Dam. The rank of economic aspect for Walanae Flood Control Project with Walimpong Dam is based on the result of the study on the multipurpose dam plan hereinafter mentioned together with hydropower project.

As for Walimpong Multipurpose Dam Project, three alternative cases as mentioned in Main Report, CHAPTER 4, Section 4.5 are examined to determine the optimum storage allocation for total effective storage capacity of 540 x $10^6 m^3$. As a result, the optimum storage allocation is 115 x $10^6 m^3$ for irrigation, 200 x $10^6 m^3$ for flood control and 225 x $10^6 m^3$ for hydropower. This plan, Walimpong Dam Plan 2, is superior to economic aspects and satisfies with the hydropower energy demand at target year.

As for the compound project, selection of the optimum plan between the compound project and sectoral irrigation and flood control projects for Bila and Boya areas lying north of Lake Tempe is carried out on account of the following advantages, and the compound project is proposed.

(1) To produce the large benefit accrued from the compound project

(2) To indicate the high value of an internal rate of return

(3) To increase agricultural potential realized by Bila and Boya Irrigation Projects as early as possible by introduction of flood control project.

8.5 FORMULATION OF THE PROPOSED DEVELOPMENT PROJECTS IN MASTER PLAN

Based on the results of the economic evaluation in previous section the following development projects are proposed.

(1) Bila-Boya Irrigation/Flood Control Project

(2) Langkemme Irrigation Project

(3) Lawo Irrigation Project

(4) Cenranae Irrigation Project

(5) Gilirang Irrigation Project

(6) Sanrego Irrigation Project

(7) Padangeng Irrigation Project

(8) Cenranae Flood Control Project

(9) Walimpong Multipurpose Dam Project

8.6 FORMULATION OF STAGE PLAN FOR PROPOSED DEVELOPMENT PROJECTS

The development schedule for the proposed component projects is formulated basically based on the value of internal rate of return and further is assessed by the following items.

(1) Effect on equalization of social and public welfare among the regions

(2) Necessity of infrastructural supports required for early implementation and smooth operation of the project, such as access to the project area and power supply for pumping irrigation scheme

(3) Unfamiliarity with pumping irrigation practice of farmers

(4) Assurance of resettlement area for inhabitants in the reservoir area of the multipurpose dam

(5) Function of a core project for development of adjacent areas

8.6.1 Project Assessment

Taking into consideration of the abovementioned items and the result of comparison of the proposed projects from the View point of effectiveness and easiness in implementation by using 24 indexes as shown in Table 8.5, following five view points are taken as the index for the project assessment;

1) Economic grow (IRR, B-C)

2) Equalization of development gap

3) Social welfare

4) Limiting factor

5) Role as a core of the Development in the objective area.

The project assessment is summerized in Table 8.6.

After examination of the project assessment, the limiting factors for project implementation are clarified as follows;

(1) Sanrego Irrigation Project

Sanrego area is the representative area of depressed region. This project is the most effective one with the highest value of an internal rate of return among the proposed development projects. The poor road condition in the Sanrego area, however, makes it difficult to transport materials necessary for project implementation and to carry out smooth marketing for agricultural products after the implementation. Such condition hinders the early implementation of the project.

(2) Cenranae Irrigation Project

This project is a pumping irrigation scheme of which the power is dependent on the hydropower energy from the Bakaru project or the multipurpose dam project. The implementation of this project, therefore, is obliged to be scheduled behind the implementation of hydropower projects mentioned above. Further farmers in the project area are unfamiliar with pumping irrigation practice.

(3) Walimpong Multipurpose Dam Project

In spite of the largest benefit among the proposed development projects, the huge amoung of investment cost is needed and the internal rate of return is low. Further some problems remain with regard to the resettlement of inhabitants in the reservoir area.

(4) Gilirang Irrigation Project

The Gilirang Project area is located in the northern edge of the objective area, which will not function as a core project for development of the adjacent area. The road condition in the area is poorly developed.

(5) Others

Bila-Boya compound project have an important role as a integrated general plan.

Langkemme area is also suitable area to be developed.

8.6.2 Stage Plan for Proposed Development Projects

On the basis of the result of the project assessment, the following stage plan is proposed.

(1) First Stage

During the period of PELITA III, the following projects are proposed to enter into implementation.

(a) Langkemme Irrigation Project

(b) Bila-Boya Irrigation/Flood Control Project

(2) Second Stage

During the period of the Fourth Five Year Development Plan (provisional name), the following three projects will be implemented.

(a) Sanrego Irrigation Project
This project must wait the road construction project during PELITA III. As CIDA proposed, the road from Ujunglamuru to Bajo must be completed during PELITA III for the success of Sanrego irrigation project with the highest potentiality for the future economic growth and for the equalization of income distribution to this depressed area.

(b) Lawo Irrigation Project

(c) Gilirang Irrigation Project

(3) Third Stage

During the period of the Fifth Five Year Development Plan (provisional name), the following four projects with IRR less than 12% will be able to start, because of the economic growth and economic stabilization by this period.

(a) Walimpong Multipurpose Dam Project

(b) Cenranae Irrigation Project
Cenranae Irrigation Plan must wait for the support by transmission lines from Bakaru hydro power project (no plan during PELITA III) or the hydro power plan in the objective area.

(c) Cenranae Flood Control Project

(d) Padangeng Irrigation Project

Target yield in these three stage plan will be accomplished in the year, 2000.

Table 3.1 Budget Allocation of Indonesia

(Unit: Rp. billion)

Item		1970/71	1971/72	1972/73	1973/74	1974/75	1975/76	1978/79
Revenues	Domestic	(74) 345	(76) 428	(79) 591	(83) 968	(88) 1,754	(82) 2,242	(78) 5,441
	Foreign Aid	(26) 121	(24) 136	(21) 158	(17) 204	(12) 232	(18) 492	(22) 1,494
	Total	(100) 466	(100) 564	(100) 749	(100) 1,172	(100) 1,986	(100) 2,734	(100) 6,935
Expenditures	Routine	(62) 288	(62) 349	(58) 438	(61) 713	(51) 1,016	(49) 1,333	(50) 3,446
	Development	(38) 178	(38) 215	(42) 314	(39) 459	(49) 970	(51) 1,401	(50) 3,489
	Total	(100) 466	(100) 564	(100) 749	(100) 1,172	(100) 1,986	(100) 2,734	(100) 6,935

Source: Ministry of Finance

Table 3.2 Development Expenditures by Sources

(Unit: Rp. billion)

	Source	1970/71	1971/72	1972/73	1973/74	1974/75	1975/76	1978/79
1.	Domestic	(32) 57	(37) 79	(49) 153	(55) 255	(76) 738	(65) 909	(57) 1,795
2.	Foreign	(68) 121	(63) 136	(51) 158	(45) 204	(24) 232	(35) 492	(43) 1,494
	Total	(100) 178	(100) 215	(100) 311	(100) 459	(100) 970	(100) 1,401	(100) 3,489

Source: Ministry of Finance

Table 3.3 Allocation Total of Development Budget of D.G.W.R. of PU. to South Sulawesi

(Unit: Rp. million)

Area	P I		P II	
South Sulawesi	3,204	2.8%	18,845	3.5%
Others	112,703	97.2	526,099	96.5
Total	115,907	100.0	544,944	100.0

Source: Ministry of Public Works Directorate General of Water Resources Development

Table 3.4 Expenditure of Development Budget by Central Gov. D.G.W.R. of P.U.

(Unit: Rp. million)

Program	P I		P II	
1. Rehabilitation of Irrigation Facilities	49,971	43.1%	143,950	26.4%
2. Construction of New Irrigation Facilities	25,034	21.6	194,685	35.7
3. Development and Improvement of Riveer and Swamp Area	39,425	34.0	195,777	35.9
4. Others	1,477	1.3	10,532	1.9
Total	115,907	100.0	544,944	100.0

Source: Ministry of Public Works Directorate General of Water Resources Development

Table 3.5 Expenditure of Development Budget by Central Gov. D.G.W.R. of P.U. (South Sulawesi)

(Unit: Rp. million)

Program	P I		P II	
1. Rehabilitation of Irrigation Facilities	1,890	59.0%	8,755	46.5%
2. Construction of New Irrigation Facilities	1,186	37.0	9,849	52.3
3. Development and Improvement of River and Swamp Area	128	4.0	241	1.3
4. Others	0	0	0	0
Total	3,204	100.0	18,845	100.0

Table 3.6 Expenditure of Development Budget by Central Government
Directorate General of Water Resources of P.U.

PELITA I

(Unit: Rp. million)

Program		1969/70		1970/71		1971/72		1972/73		1973/74		Total	
Rehabilitation of Irrig. Facilities	Nation	7,603	100	7,865	100	9,192	100	11,011	100	14,300	100	49,971	100
	S.S.	310	4.1	267	3.4	288	3.1	323	2.9	702	4.9	1,890	3.8
Construction of New Irrig. Facilities	Nation	5,335	100	4,566	100	4,739	100	5,394	100	5,000	100	25,034	100
	S.S.	211	4.0	250	5.5	286	6.0	285	5.3	152	3.0	1,186	4.7
River Develop. and Improvement	Nation	1,942	100	901	100	920	100	1,383	100	1,200	100	6,346	100
	S.S.	25	1.3	25	2.8	25	2.7	28	2.0	26	2.2	128	2.0
Development of Other Water Resources	Nation	5,826	100	6,336	100	6,475	100	7,041	100	7,400	100	33,079	100
	S.S.	-	0	-	0	-	0	-	0	-	0	-	0
Study and Investigation of Water Resources	Nation	70	100	178	100	139	100	225	100	272	100	883	100
	S.S.	-	0	-	0	-	0	-	0	-	0	-	0
Increase of Effectivity of Irrig. Facilities	Nation	-	-	10	100	5	100	15	100	20	100	50	100
	S.S.	-	-	-	0	-	0	-	0	-	0	-	0
Physical Improvement	Nation	-	-	119	100	75	100	175	100	175	100	544	100
	S.S.	-	-	-	0	-	0	-	0	-	0	-	0
Total	Nation	20,776	100	19,975	100	21,545	100	25,244	100	28,367	100	115,907	100
	S.S.	546	2.6	542	2.7	599	2.8	637	2.5	880	3.1	3,204	2.8

Source: Ministry of Public Works, Directorate General of Water Resources Development

Table 3.7 Expenditure of Development Budget by Central Government
Directorate General of Water Resources of P.U.

PELITA II

(Unit: Rp. million)

Program		1974/75		1975/76		1976/77		1977/78		1978/79		Total	
Rehabilitation of Irrig. Facilities	Nation	10,736	100	16,840	100	26,485	100	36,157	100	53,732	100	143,950	100
	S.S.	850	7.9	1,569	9.3	1,777	6.7	2,176	6.0	2,384	4.4	8,755	6.1
Construction of New Irrig. Facilities	Nation	14,339	100	26,131	100	36,203	100	49,911	100	68,100	100	194,685	100
	S.S.	750	5.2	1,620	6.2	1,893	5.2	2,442	4.9	3,143	4.6	9,849	5.1
Development of River and Swamp Area	Nation	10,095	100	36,829	100	37,580	100	46,595	100	64,678	100	195,777	100
	S.S.	38	0.4	40	0.1	40	0.1	45	0.1	79	0.1	241	0.1
Study and Investigation of Water Resources	Nation	1,030	100	2,000	100	2,000	100	2,218	100	2,874	100	10,122	100
	S.S.	-	0	-	0	-	0	-	0	-	0	-	0
Increase of Effectivity of Irrig. Facilities	Nation	25	100	25	100	25	100	25	100	25	100	125	100
	S.S.	-	0	-	0	-	0	-	0	-	0	-	0
Physical Infrastructural Improvement	Nation	75	100	60	100	50	100	50	100	50	100	285	100
	S.S.	-	0	-	0	-	0	-	0	-	0	-	0
Total	Nation	36,300	100	81,885	100	102,343	100	134,957	100	189,459	100	544,944	100
	S.S.	1,637	4.5	3,229	3.9	3,710	3.6	4,663	3.5	5,606	3.0	18,845	3.5

Table 3.8 Expenditure of Development Budget by Project (P.I) in S.S. Directorate General of Water Resources of P.U.

(Unit: Rp. million)

Program and Project	1969/70		1970/71		1971/72		1972/73		1973/74		Total	
1. Rehabilitation of Irrigation Facilities	310	56.8	267	49.3	288	48.1	323	50.7	702	79.8	1,890	59.0
1-1 Sadang Irrigation Project from PROSIDA	250	45.8	217	40.0	243	40.6	243	38.1	592	67.3	1,545	48.2
1-2 Other Irrigation Projects	60	11.0	50	9.2	45	7.5	80	12.6	110	12.5	345	10.8
2. Construction of New Irrigation Project	211	38.6	250	46.1	286	47.7	285	44.7	152	17.3	1,186	37.0
2-1 Kelara Irrigation Project	211	38.6	250	46.1	275	45.9	275	43.2	135	15.3	1,146.	35.8
2-2 Village (Desa) Irrigation Develop. and Inprovement	-	0	-	0	11	1.8	12	1.9	17	1.9	40	1.2
3. River Development and Improvement	25	4.6	25	4.6	25	4.2	28	4.4	26	3.0	128	4.0
Total	546	100.0	542	100.0	599	100.0	637	100.0	880	100.0	3,204	100.0

Table 3.9 Expenditure of Development Budget by Projects (P.II) in S.S. Directorate General of Water Resources of P.U.

(Unit: Rp. million)

Program and Project	1974/75		1975/76		1976/77		1977/78		1978/79		Total	
1. Rehabilitation of Irrigation Facilities	850	51.9	1,569	48.6	1,777	47.9	2,176	46.7	2,384	42.5	8,755	46.5
1-1 Sadang Irrigation Project from PROSIDA	650	39.7	1,276	39.5	1,442	38.9	1,780	38.2	1,859	33.2	7,007	37.2
1-2 Tabo - Tabo Irrigation Project	200	12.2	293	9.1	335	9.0	396	8.5	525	9.4	1,748	9.3
2. Construction of New Irrigation Facilities	750	45.8	1,620	50.2	1,893	51.0	2,442	52.4	3,143	56.1	9,849	52.3
2-1 New Irrigation Project	340	20.8	-	0	-		-		-		340	1.8
2-2 Small Scale Irrig. Projects (Sedang Kecil and Sederhana)	-	0	782	24.2	860	23.2	590	12.7	1,384	24.7	3,617	19.2
2-3 Luwu Irrigation Project	200	12.2	517	16.0	755	20.4	1,534	32.9	1,150	20.5	4,156	22.1
2-4 Kelara Irrigation Project	200	12.2	249	7.7	193	5.2	199	4.3	250	4.5	1,091	5.8
2-5 Water Management in Farmers level	10	1.0	15	4.6	15	0.4	-	0	-	0	40	0.2
2-6 Water Resources Develop. Project (P3SA)	-	0	31	1.0	41	1.1	85	1.8	310	5.5	467	2.5
2-7 Directorate of Hydraulic Eng. (DPMA)	-	0	26	1.0	29	1.0	35	1.0	50	1.0	140	0.7
3. River Development and Improvement	38	2.3	40	1.0	40	1.1	45	1.0	79	1.4	241	1.3
Total	1,637	100.0	3,229	100.0	3,710	100.0	4,663	100.0	5,606	100.0	18,845	100.0

Table 4.1 Balance of Demand and Supply of Rice in whole Indonesia (1976)

(Unit: 1,000 tons)

	Region	Population	Production of Paddy	Supply of Rice	Demand of Rice	Surplus or Deficit of Rice
		x 1000				
1.	Sumatera	24,282	6,434	3,217	2,914	303
2.	Java	85,290	18,078	9,039	10,233	-1,194
2.1	West	30,066	7,226	3,613	3,608	5
2.2	Central	26,970	5,219	2,610	3,236	-626
2.3	East	28,254	5,633	2,817	3,390	-573
3.	Kalimantan	5,925	1,611	806	711	95
3.1	West	2,323	630	315	279	36
3.2	Central	805	209	105	97	8
3.3	South	1,954	635	318	235	83
3.4	East	843	137	69	101	-32
4.	Bali & Nusatenggara	7,578	1,635	818	909	-91
5.	Sulawesi	9,813	2,420	1,210	1,178	32
5.1	North	1,975	268	134	237	-103
5.2	Central	1,051	243	122	126	-4
5.3	South	*5,573 5,966	1,834 1,847	917 924	816 717	101 207
5.4	South East	821	62	31	99	-68
6.	Maluku & Irian Jaya	2,305	24	12	277	-265
	Total	135,193	30,203	15,102	16,222	-1,120

(1) Quantities of Rice = (Quantities of Paddy) x 0.5
(2) Per Capita Consumption of Rice = 120 kg/person year
Source: "Statistical yearbook of Indonesia" (1976)
BIRO PUSAT STATISTIK JAKARTA
Note: * "Daftar Jumlah Penduduk W.N.R.I." Ujung Pandang: Panitia Pemilihan Daerah Tingkat I
"Monografi Sulawesi Selatan, Buku I" BAPPEDA, Sul-Sel.

Table 4.2 Balance of Supply and Demand of Rice in South Sulawesi (1976)

(Unit: 1,000 tons)

Case	Market	Population	Production of Paddy	Supply of Rice	Quantities Demanded of Rice	Surplus of Rice	Inter-Insular Trade	Others
					x 1,000 t			
1	Local	4,905			736			
	Regional	668			100			
	Total	5,573	1,834	1,100	836	264	71	193
2	Local	4,905			736			
	Regional	668			80			
	Total	5,573	1,834	917	816	101	71	30

(1) Local Market = Kabupatens (Rural area)
(2) Regional Market = Kotamadya (Urban area)
(3) Total Market = Whole South Sulawesi
(4) Method of Estimation: Case 1: Supply of Rice = 0.6 x Production of Paddy
Per Capita Consumption = 150 kg/person, year
Case 2: Supply of Rice = 0.5 x Production of Paddy
Per Capita Consumption
by Local Consumers = 150 kg/person, year
by Regional Consumers = 120 kg/person, year
(5) Interinsuler Trade
i) Through DOLOG, 50,000 tons of rice are exported outside of South Sulawesi as a interinsular trade (in 1976/1977)
ii) Through DOLOG and collectors in Pare-Pare Port 64,000 tons of rice is transported to the other regions from South Sulawesi (in 1976)
iii) 90% of total quantities treated for interinsular trade from South Sulawesi is exported through Pare-Pare Port (in 1976/1977)
iv) Total quantities of rice for interinsular trade
64 x 100 / 90 = 71 [x1,000t] (DOLOG + Collector)
71 - 50 (DOLOG) = 21 [x1,000t] (Collector)

Source: "Daftar Jumlah Penduduk W.N.R.I", Ujung Pandung: Panita Pemilihan 1977
"Monografi Sulawesi Selatan, Angka I" BAPPEDA, Sul-Sel

Table 4.3 Average Productivity of Paddy per Ha of Harvested Area

(Unit: t/ha)

	Region	1971	1972	1973	1974	1975	1976
1.	Sumatera	2.8	2.9	3.0	3.2	3.2	3.4
2.	Java	3.7	3.6	3.7	3.8	3.9	4.0
2.1	West	3.5	3.4	3.6	3.6	3.7	4.0
2.2	Central	3.8	3.6	3.8	3.9	3.8	4.0
2.3	East	3.8	3.9	3.9	4.2	4.0	4.2
3.	Kalimantan	1.7	2.0	1.9	2.1	2.0	2.1
3.1	West	1.3	1.3	1.6	1.8	1.8	2.0
3.2	Central	1.7	1.7	2.2	1.8	1.8	1.8
3.3	South	2.1	2.4	2.4	2.6	2.4	2.1
3.4	East	1.7	2.3	1.7	1.8	1.7	1.8
4.	Bali & Nusatenggara	2.7	2.7	3.3	3.5	3.4	3.4
5.	Sulawesi	2.9	2.9	3.2	2.8	2.9	3.4
5.1	North	3.0	2.6	3.9	3.1	3.2	3.2
5.2	Central	1.8	2.6	2.7	3.1	2.5	2.5
5.3	South	3.2	3.1	3.2	2.8	3.1	3.7
5.4	South East	2.0	1.8	2.7	1.7	1.7	2.0
6.	Maluku & Irian Jaya	1.4	1.2	0.9	0.8	1.0	1.0
	Total	3.2	3.2	3.4	3.4	3.4	3.6

Source: Statistical yearbook of Indonesia 1976
Biro Pusat Statistik, Jakarta

Table 4.4 Average Population per Ha of Paddy Harvested Area

(Unit: persons/ha)

	Region	1971	1972	1973	1974	1975	1976
1.	Sumatera	10.6	11.2	11.2	12.0	12.5	12.7
2.	Java	17.4	18.1	17.6	17.3	18.0	19.1
2.1	West	14.8	15.7	14.9	15.0	16.2	16.6
2.2	Central	17.4	18.0	17.7	17.4	18.2	20.5
2.3	East	21.0	21.6	21.3	20.6	20.9	21.1
3.	Kalimantan	7.3	8.7	7.7	7.8	7.8	7.7
3.1	West	6.5	6.6	7.0	7.3	7.6	7.5
3.2	Central	6.9	7.6	8.9	6.9	6.9	6.9
3.3	South	7.4	8.0	7.0	7.6	7.4	7.4
3.4	East	7.4	8.0	7.0	7.6	7.4	7.4
4.	Bali & Nusatenggara	14.0	14.6	15.1	14.8	15.6	15.9
5.	Sulawesi	11.8	16.0	14.2	13.9	13.3	13.7
5.1	North	26.6	30.1	33.2	32.1	24.1	23.5
5.2	Central	10.1	12.0	12.4	12.8	10.9	10.9
5.3	South	10.0	14.1	11.5	12.0	11.2	11.8
5.4	South East	15.0	20.0	30.4	21.6	28.6	25.7
6.	Maluku & Irian Jaya	184.7	173.8	142.7	156.7	125.0	96.0
	Total	14.4	14.5	15.0	15.1	15.6	16.2

Table 5.1 Population

(Unit: 1,000 persons)

Kabupaten \ Year	1971	1972	1973	1974	1975	1976	1977
South Sulawesi	5,189	5,292	5,296	5,339	5,423	5,656	5,710
Ujung Pandang	384	561	564	558	561	596	602
Pare-Pare	72	73	72	73	74	78	79
Bone	515	602	609	612	617	621	622
Wajo	345	323	307	308	346	370	372
Soppeng	230	232	233	233	236	238	241
Sidrap	181	181	182	184	186	193	196
Others	3,462	3,320	3,329	3,371	3,403	3,560	3,799

Source of data: "Perkembangan Penduduk Sul. Sel."
Kantor Sensus dan Statistik Propinsi Sulawesi Selatan.

Table 5.2 Population, Area and Population Density

(1977)

Kabupaten	Population (1,000 persons)	Area (km^2)	Population Density (persons/km^2)
Bone	622	4,556	137
Soppeng	241	1,400	172
Wajo	372	2,278	163
Sidrap	195	2,339	84
Sub Total	1,430	10,574	135
Luwu	431	25,026	17
South Sulawesi	5,710	72,761	78

Source: Perkembangan Penduduk Sulawesi Selatan
Kantor Sensus dan Statistik Propinsi Sulawesi Selatan

Table 5.3 Total Production of Paddy in South Sulawesi

(Unit: 1,000 tons)

Year	Paddy Land		Upland	Total
	Wet Season	Dry Season		
1969	1,042	158	68	1,269
1970	1,444	181	65	1,691
1971	1,303	316	61	1,682
1972	760	445	27	1,233
1973	1,195	352	44	1,592
1974	973	308	26	1,308
1975	1,354	383	31	1,769
1976	1,335	466	32	1,834

Source: Monografi Sulawesi Selatan

Table 5.4 Production of Agricultural Food Stuff in 1977

(Unit: ton)

Agr. Products	South Sulawesi	Bone	Wajo	Soppeng	Sidrap	Others
1. Paddy	(100.0)	(7.93)	(4.29)	(6.30)	(12.96)	(68.52)
	2,031,363	161,112	87,343	128,148	263,286	1,391,474
2. Maize	(100.0)	(25.18)	(6.89)	(7.05)	(0.60)	(60.28)
	186,056	46,860	12,824	13,132	1,134	112,106
3. Cassava	(100.0)	(6.30)	(2.60)	(0.34)	(1.22)	(89.54)
	239,142	15,076	6,224	827	2,936	214,079
4. Sweet Potato	(100.0)	(16.92)	(2.70)	(0.51)	(1.40)	(78.17)
	53,694	9,086	1,452	276	751	42,129
5. Grounnuts	(100.0)	(49.08)	(16.29)	(2.16)	(0.69)	(31.78)
	33,066	16,231	5,388	716	229	10,502
6. Green Bean	(100.0)	(10.24)	(38.26)	(2.21)	(0.31)	(48.98)
	19,546	2,003	7,480	432	62	9,569
7. Soya bean	(100.0)	(3.72)	(32.43)	(6.87)	(0.68)	(56.3)
	6,965	259	2,259	479	48	3,920
8. Vegetable	(100.0)	(0.63)	(10.59)	(2.54)	(2.60)	(83.64)
	51,350	326	5,443	1,304	1,337	42,940
9. Fish	(100.0)	(9.57)	(7.50)	(1.97)	(0.65)	(80.31)
	188,586	18,063	14,157	3,725	1,237	151,404

* Fish : Including brakish and sea fish
* Source: Sulawesi Selatan Dalam Angka Tahun (Data of South Sulawesi 1977)

Table 5.5 Productivity of Paddy per Ha of Harvested Area in Wet Season

(Unit: t/ha)

Kabupaten	1974	1975	1976	1977
Wajo	2.4	3.5	2.9	2.7
Bone	1.7	2.4	2.3	2.4
Soppeng	2.2	3.7	3.7	4.3
Sidrap	2.6	2.6	5.2	4.4

Source: "Laporan Tahunan Statistik" 1977
Inspeksi Dinas Pertanian Rakyat Propinsi Daerah Tk.I Sul-Sel.

Table 5.6 Number of Cattle (1977/78)

(Unit: Number)

		South Sulawesi	Bone	Wajo	Soppeng	Sidrap
1.	Horse	(100.0) 190,878	(14.4) 27,558	(13.7) 26,121	(8.5) 16,260	(4.9) 9,330
2.	Cow (for Beef)	(100.0) 602,339	(22.2) 133,442	(7.8) 47,111	(8.3) 49,753	(5.8) 34,856
3.	Cow (for Milk)	(100.0) 118	(12.7) 15	(14.4) 17	-	-
4.	Buffalo	(100.0) 418,338	(9.6) 40,940	(13.4) 55,852	(1.0) 2,321	(4.2) 17,739
5.	Goat	(100.0) 399,091	(14.5) 17,884	(7.6) 30,390	(2.8) 11,233	(3.1) 12,275
6	Sheep	(100.0) 14,707	(20.8) 3,065	(2.5) 365	(0) 0	(0) 0
7.	Pig	(100.0) 521,742	(0) 0	(0) 0	(0) 0	(0) 0
8.	Chicken (local)	(100.0) 11,211,750	(15.8) 1,767,109	(9.4) 1,052,482	(12.8) 1,433,787	(5.0) 565,079
9.	Chicken (Imported)	(100.0) 71,920	(0) 0	(0) 0	(4.2) 3,010	(0) -
10.	Duck	(100.0) 1,714,223	(41.8) 715,826	(12.6) 215,482	(6.3) 107,756	(2.5) 43,447

Source: Inspektorat Dinas Peternakan Daerah Tingkat I Sul-Sel.
"Sul-Sel. Dalam Angka" 1977
Kantor Sensus dan Statistik Propinsi Sul-Sel.

Table 5.7 Fish Production (1977)

(Unit: tons)

Classification	South Sulawesi	Bone	Wajo	Soppeng	Sidrap	Others
1. Marine Fish	145,216	15,683	3,173	0	0	126,360
2. Inland Fish	43,370	2,381	10,985	3,725	1,237	25,042
2.1 Culture	25,689	1,953	1,105	25	2	22,604
1) Brackish	24,300	1,953	1,100	0	0	21,247
2) Pond	333	0	5	4	0	324
3) Paddy Field	1,056	0	0	21	2	1,033
2.2 Fishing	17,681	428	9,880	3,700	1,235	2,438
1) Lake	13,704	0	8,815	3,654	1,235	0
2) Swamp	2,026	294	1,065	27	0	640
3) River	1,951	134	0	19	0	1,798
Total	188,587	18,064	14,158	3,725	1,237	151,403

Source: Kantor Dinas Perikanan TK. I Sul-Sel.
"Sulawesi Selatan Dalam Angka" 1977
Kantor Sensus dan Statistik Propinsi Sulawesi Selatan.

Table 5.8 Per Capita Production of Fish (1977)

(Unit: kg/person)

Kabupaten	Inland Fish	Marine Fish	1 + 2
1. Wajo	26.6	11.5	38.1
2. Bone	0.7	28.4	29.0
3. Soppeng	15.4	0	15.5
4. Sidrap	6.3	0	6.3

Source: See Table 5.7

Table 5.9 Fishermen's Household (1977)

(Unit: Number)

Classification	South Sulawesi	Bone	Wajo	Soppeng	Sidrap
1. Marine Fish	25,622	2,885	1,088	0	0
2. Inland Fish	29,003	1,674	4,888	1,116	264
2.1 Culture	19,295	1,112	874	157	10
1) Brackish	11,175	1,112	804	0	0
2) Pond	1,356	0	70	34	0
3) Paddy Field	6,764	0	0	123	10
2.2 Fishing	9,708	562	4,014	959	254
1) Lake	4,364	0	3,216	894	254
2) Swamp	2,936	361	798	30	0
3) River	2,408	201	0	35	0
Total	54,625	4,559	5,976	1,116	264

Source: Kanwil Dinas Perikanan Tk.I Sul-Sel.
"Sulawesi Selatan Dalam Angka" 1977
Kantor Sensus dan Statistik Propinsi Sul-Sel.

Table 5.10 Labour Productivity (1977)

(Unit: t/household)

Classification	South Sulawesi	Bone	Wajo	Soppeng	Sidrap
1. Marine Fish	5.66	5.44	2.92	-	-
2. Inland Fish	1.50	1.42	2.25	3.34	4.69
2.1 Culture	1.33	1.76	1.26	0.16	0.20
2.2 Fishing	1.82	0.76	2.46	3.86	4.90
Total	3.45	3.96	2.37	3.34	4.69

Table 5.11 Population, Area and Population Density

(in 1976)

No.	Kabupaten & Kota Madya.	Total Population		1971 - 76 Increase (%)	1976 Area (km^2)	1976 Density (persons/km^2)
		1971 [b]	1976 [c]			
1.	Wajo	322,225	369,342	14.6	2,422	152
2.	Bone	596,943	587,974	-1.5	4,555	129
3.	Soppeng	230,625	235,226	2.0	1,500	157
4.	Sidrap	181,588	191,386	5.4	2,340	82
5.	Luwu	326,062	420,608	29.0	24,349	17
6.	Mamuju	69,668	82,891	18.9	12,409	7
7.	Tana Toraja	308,054	311,559	1.1	4,234	74
8.	Polmas	313,559	338,831	8.1	9,985	34
9.	Majene	78,925	92,256	16.9	1,932	48
10.	Enrekang	121,140	127,992	5.6	1,941	66
11.	Pinrang	258,214	268,436	4.0	2,509	109
12.	Barru	132,718	138,173	4.1	924	150
13.	Pangkep	205,169	204,543	-0.3	798	256
14.	Maros	199,424	186,482	-6.5	1,532	122
15.	Sinjai	149,394	159,294	6.6	1,025	148
16.	Gowa	385,616	327,517	-15.1	1,695	193
17.	Takalar	152,553	160,822	5.4	450	357
18.	Jeneponto	200,605	218,645	9.0	790	277
19.	Bantaeng	89,609	103,623	15.6	470	220
20.	Bulukumba	260,841	284,440	9.0	1,280	222
21.	Selayar	92,342	34,591	2.4	224	422
22.	Pare-Pare	72,491	79,448	9.6	111	717
23.	Ujung Pandang	434,168	589,343	35.7	116	5,086
	Total	5,179,911	5,573,422	7.5	77,638	72

Source: Central Bureau of Statistiks ..... b

Panitia Pemilihan Daerah Tingkat I Sulawesi Selatan, "Daftar Jumlah Penduduk W.N.R.I. "(Ujung Pandang Panitia Pemilihan 1977) c

Table 5.12 Balance of Supply and Demand of Rice in 4 Kabupaten (1977)

(Unit: 1,000 t)

Kabupaten	Population	Production of Paddy	Supply of Rice	Quantities Demanded of Rice	Surplus of Rice	Inter-insular trade	Others
Wajo	372	87	44	56	-12		
Bone	622	161	81	93	-12		
Soppeng	241	128	64	36	28		
Sidrap	195	263	131	29	102		
Sub Total (4 Kab.)	1,430	639	320	214	106		
Others	4,280	1,391	696	622	74		
South Sulawesi	5,710	2,030	1,016	836	180	76	104

(1) Qualities of Rice = 0.5 x (Qualities of Paddy)

(2) Per Capita Consumption of Rice;
for Kabupaten (local consumers) 150 kg/person year
for Kotamadya (regional consumers) 120 kg/person year

(3) Interinsular trade estimated by DOLOG of South Sulawesi and according to the interview Survey in Pare-Pare.

Table 5.13 No. of Rice Mill and its Average Capacity

(1977)

Kabupaten	Production (tons)	No. of Rice Mill (numbers)	tons/numbers
Wajo	89,343	626	140
Bone	161,112	401	402
Soppeng	128,148	860	149
Sidrap	263,286	472	558

Source: (1) Production "Sulawesi Selatan delam angka Tahun" (1977)

(2) No. of Rice Mill "DOLOG of South Sulawesi" (1978)

Table 5.14 Distribution of Industries in South Sulawesi

(1974/75)

	Industries	Small Scale						Med. Scale (Sul-Sel.)	Large Scale (Sul-Sel.)
		Wajo	Bone	Soppeng	Sidrap	Others	Total		
1.	Food Manufactures	(505) /1 529	(31) /1 39	(15) 16	(25) 58	647	1,289	24	2
2.	Average Industries	-	-	-	-	6	6	1	0
3.	Tobacco Manufacture	20	7	27	1	26	81	2	0
4.	Textile, Wear, Leather	58	-	2	1	97	158	7	3
5.	Wood Products, Paper Printing, Publishing	71	40	5	13	269	398	44	2
6.	Chemicals, Petroleum, Products, Rubber	-	-	-	-	13	13	2	1
7.	Pottery, Ware, Glass, Cement, Non Metalic, Mineral	23	40	24	1	303	391	12	2
8.	Iron, Steel Machinery	12	42	3	2	123	182	7	4
9.	Others	0	0	2	0	6	8	1	0
	Total	713	168	79	76	1,490	2,526	100	14

Source: Sensus Industri 1974/75 Pebruari 1977

Note : /1; Only Rice Mill

Table 6.1.(1) Population, Area and Population Density

Kecamatan		1974	1975	1976	1977 Population (x1,000)	1977 Area (km^2)	1977 Population Density (persons/km^2)
1. Wajo		308.2	345.3	370.9	372.1	2,465	151
101	Tempe	39.5	41.1	45.3	45.5	38	1,199
102	Belawa	30.6	35.6	36.7	36.8	173	213
103	Tanasitolo	28.9	33.1	36.2	25.2	154	229
104	Majauleng	29.5	32.4	33.1	33.5	231	145
105	Pammana	30.7	36.9	38.2	38.4	155	248
106	Sabbangparu	31.9	36.7	40.9	41.3	131	315
107	Maniangpajo	15.6	19.5	20.3	20.9	323	65
108	Pitumpanua	31.5	33.5	38.2	38.2	590	65
109	Sajoanging	33.6	37.0	37.4	37.6	321	117
110	Takkalala	36.3	39.5	44.4	44.6	353	126
2. Bone		612.9	617.0	621.5	622.3	4,630	134
201	Tanete Riatang	50.2	51.0	52.1	52.2	33	1,582
202	Barebbo	22.4	23.0	23.3	23.4	152	154
203	Palakka	19.3	33.7	33.8	33.9	122	278
204	Awangpone	34.7	34.4	34.6	34.1	137	249
205	Sibulue	25.3	25.5	25.5	25.5	151	169
206	Cina	16.6	17.2	17.3	17.3	159	109
207	Ponre	12.6	12.8	12.7	12.7	288	44
208	Ulaweng	44.3	26.4	44.6	44.6	217	206
209	Tellusiatinge	42.8	44.0	45.0	45.2	146	310
210	Ajangale	49.8	47.2	47.2	47.9	177	270
211	Dua Boccoe	39.7	40.4	40.4	40.4	159	254
212	Cenrana	24.2	24.4	24.4	24.4	122	200
213	Lappa Riaja	45.7	44.9	46.2	46.5	302	154
214	Lamuru	36.2	36.5	36.9	37.0	736	50
215	Mare	18.0	18.6	18.8	18.9	278	68
216	Libureng	22.0	22.0	20.6	20.6	368	56
217	Tonra	15.1	15.2	15.4	15.4	171	90

Table 6.1.(2) Population, Area and Population Density

	Kecamatan	1974	1975	1976	1977 Population (x1,000)	1977 Area (km^2)	1977 Population Density (persons/km^2)
218	Bontocani	13.0	12.4	12.7	12.6	362	35
219	Kahu	26.6	27.1	27.1	27.1	256	106
220	Salomekko	17.8	18.0	18.2	18.0	148	122
221	Kajuara	23.2	23.8	24.5	24.6	146	168
3.	Soppeng	233.7	219.7	238.4	241.0	1,400	172
301	Lalabata	62.4	46.7	63.4	64.1	400	160
302	Mario Riawa	29.4	29.6	30.0	30.4	320	95
303	Lili Rilau	47.3	50.7	51.0	51.7	199	260
304	Lili Riaja	48.4	48.9	49.2	49.7	181	274
305	Mario Riwawo	43.3	48.8	44.8	45.1	300	151
4.	Sidrap	184.7	186.1	193.1	196.0	2,340	84
401	Maretengngae	32.7	32.9	35.3	36.2	121	299
402	Pancalautang	18.6	18.3	16.6	18.9	138	137
403	Tellulimpue	15.2	15.3	16.0	16.2	43	378
404	Watangpulu	13.9	14.1	15.3	15.5	105	147
405	Baranti	26.0	26.2	24.8	25.0	48	520
406	Pancarijang	33.6	34.3	33.2	33.5	60	563
407	Dua Pitue	44.8	45.2	49.9	50.5	1,825	28

Source : Kepala Kantor Sensus & Statistik, Wajo, Bone, Soppeng and Sidrap.

Maningpajo : In 1976 - number of desa became 5 from 4 in 1975

Pitumpanua : In 1976, number of desa became 6 from 7 in 1975

Table 6.2.(1) Informations on Production Conditions of Wet Season Paddy

	Kecamatan	Year	P.A./1 (ha)	D.A./2 (ha)	H.A./3 (ha)	Production (t)	t/ha
1.	Wajo	1975	63,941	4,936	59,005	204,342	3.5
		1976	66,647	29,579	37,050	105,420	2.9
		1977	64,510	32,912	31,598	84,662	2.7
	101 Tempe	1975	213	0	213	786	3.7
		1976	218	112	106	297	2.8
		1977	106	15	91	182	2.0
	102 Belawa	1975	4,533	1,225	3,308	12,908	3.9
		1976	4,572	2,446	2,126	8,151	3.8
		1977	4,467	1,953	2,514	9,110	3.6
	103 Tanasitolo	1975	3,001	0	3,001	9,006	3.0
		1976	4,095	3,588	507	1,163	2.2
		1977	3,972	3,399	573	850	1.5
	104 Majauleng	1975	9,711	916	8,795	31,973	3.6
		1976	9,881	4,360	5,521	16,031	2.9
		1977	9,402	6,294	3,108	8,275	2.8
	105 Pammana	1975	3,467	30	3,473	13,466	3.9
		1976	3,450	1,803	1,647	3,751	2.3
		1977	3,468	1,529	1,939	5,062	2.6
	106 Sabbangparu	1975	2,270	1,072	1,198	3,382	2.8
		1976	2,310	1,464	846	2,457	2.9
		1977	2,492	1,490	1,052	2,904	2.8
	107 Maniangpajo	1975	5,510	842	4,675	18,256	3.9
		1976	6,925	5,198	1,727	2,808	1.6
		1977	5,998	3,281	2,697	6,536	2.4
	108 Pitumpanua	1975	6,834	149	6,685	25,283	3.8
		1976	7,526	1,825	5,701	15,678	2.7
		1977	6,284	3,048	3,236	8,599	2.7
	109 Sajoangging	1975	15,475	702	14,773	44,284	3.0
		1976	14,750	4,273	10,477	27,391	2.6
		1977	15,421	7,423	7,998	19,991	2.5

/1: P.A. = Planted Area
/2: D.A. = Damaged Area
/3: H.A. = Harvested Area

Table 6.2.(2) Informations on Production Conditions of Wet Season Paddy

	Kecamatan		Year	P.A./1 (ha)	D.A./2 (ha)	H.A./3 (ha)	Production (t)	t/ha
	110	Takkalala	1975	12,920	0	12,920	44,997	3.5
			1976	12,920	4,528	8,382	27,693	3.3
			1977	12,920	4,530	8,390	23,153	2.8
2.	Bone		1975	74,875	8,293	66,582		
			1976	71,514	15,758	55,756	141,723	2.5
			1977	73,284	12,239	61,045	144,238	2.4
	201	Tanete Riatang	1975	2,540	190	2,350		
			1976	2,015	228	1,787	5,468	3.1
			1977	2,467	44	2,423	5,415	2.2
	202	Barebbo	1975	3,561	57	3,504		
			1976	5,248	1,471	3,777	13,295	3.5
			1977	5,350	151	5,199	16,521	3.2
	203	Palakka	1975	3,815	321	3,494		
			1976	4,358	334	4,025	13,297	3.3
			1977	4,377	0	4,377	9,650	2.2
	204	Awangpone	1975	5,567	664	4,903		
			1976	4,566	601	3,965	12,668	3.2
			1977	4,729	126	4,603	13,750	3.0
	205	Sibulue	1975	6,000	1,500	4,500		
			1976	5,994	1,385	4,609	14,658	3.2
			1977	5,726	88	5,638	14,865	2.6
	206	Cina	1975	4,774	54	4,720		
			1976	4,025	339	3,686	7,704	2.4
			1977	4,900	76	4,825	12,238	2.5
	207	Ponre	1975	1,780	0	1,780		
			1976	1,885	253	1,632	2,807	1.7
			1977	1,698	115	1,503	3,237	2.1
	208	Ulaweng	1975	725	115	570		
			1976	670	97	573	1,266	2.2
			1977	762	15	747	1,308	1.8
	209	Tellusiatinge	1975	4,982	2,403	2,579		
			1976	3,994	807	3,190	6,237	2.0
			1977	4,067	836	3,231	7,171	2.2

Table 6.2.(3) Informations on Production Conditions of Wet Season Paddy

Kecamatan	Year	P.A./1 (ha)	D.A./2 (ha)	H.A./3 (ha)	Production (t)	t/ha
210 Ajangale	1975	4,753	1,500	3,253		
	1976	4,750	1,014	3,736	9,153	2.5
	1977	4,375	1,300	3,075	6,242	2.0
211 Dua Boccoe	1975	3,387	624	2,763		
	1976	1,982	454	1,528	4,056	2.7
	1977	2,612	822	1,990	4,328	2.2
212 Cenrana	1975	5,929	3,693	2,236		
	1976	5,075	1,175	3,900	9,126	2.3
	1977	3,954	576	3,378	6,604	2.0
213 Lappa Riaja	1975	5,156	657	4,499		
	1976	5,250	1,127	4,123	12,010	2.9
	1977	5,345	52	5,273	13,678	2.6
214 Lamuru	1975	2,495	16	2,479		
	1976	890	9	882	1,896	2.2
	1977	1,659	85	1,574	3,904	2.5
215 Mare	1975	4,338	0	4,338		
	1976	3,725	1,645	2,080	5,849	2.8
	1977	4,217	105	4,112	7,504	1.8
216 Libureng	1975	2,417	6	2,411		
	1976	4,360	1,088	3,272	4,385	1.3
	1977	3,927	1,379	2,548	4,969	2.0
217 Tonra	1975	1,925	2	1,923		
	1976	2,165	412	1,753	3,261	1.9
	1977	2,075	1,230	845	1,462	1.7
218 Bontocani	1975	2,155	0	2,155		
	1976	1,569	0	1,569	3,436	2.2
	1977	1,646	72	1,574	3,069	2.0
219 Kahu	1975	4,479	7	4,472		
	1976	4,368	2,621	1,742	3,280	1.9
	1977	5,464	2,688	2,776	5,620	2.0
220 Salomekko	1975	2,310	0	2,310		
	1976	2,257	350	1,907	3,776	2.0
	1977	2,175	1,410	765	1,316	1.7

Table 6.2.(4) Informations on Production Conditions of Wet Season Paddy

	Kecamatan	Year	P.A./1 (ha)	D.A./2 (ha)	H.A./3 (ha)	Production (t)	t/ha
	221 Kajuara	1975	1,788	137	1,651		
		1976	2,368	351	2,017	4,095	2.0
		1977	1,759	1,069	690	1,387	2.0
3.	Soppeng	1974	19,330	4,863	14,467	32,129	2.2
		1975	21,646	1,881	19,945	70,379	3.5
		1976	20,861	2,127	18,734	68,512	3.7
		1977	21,039	4,504	16,526	70,073	4.2
	301 Lalabata	1974	6,716	1,274	5,442	13,451	2.5
		1975	6,571	3	6,568	25,270	3.9
		1976	6,416	330	6,086	21,705	3.6
		1977	6,233	709	5,524	26,305	4.8
	302 Mario Riawa	1974	1,736	1,320	416	308	0.7
		1975	4,114	915	3,199	11,950	3.7
		1976	3,500	913	2,583	7,529	2.9
		1977	3,780	1,780	1,992	6,953	3.5
	303 Lili Rilau	1974	2,655	106	2,549	3,994	0.6
		1975	2,738	879	1,859	5,892	3.2
		1976	2,722	71	2,651	5,077	1.9
		1977	2,924	1,133	1,591	5,734	3.6
	304 Lili Riaja	1974	6,479	1,962	4,517	10,786	2.4
		1975	6,479	87	6,392	21,006	3.3
		1976	6,479	252	6,227	31,030	5.0
		1977	6,479	846	5,633	23,985	4.3
	305 Mario Riwawo	1974	1,744	201	1,543	3,590	2.3
		1975	1,744	0	1,744	6,261	3.6
		1976	1,744	561	1,183	3,171	2.7
		1977	1,822	36	1,786	7,066	4.0
4.	Sidrap	1973	29,935	6,826	23,109	55,208	2.4
		1974	25,760	1,340	24,421	83,727	3.4
		1975	35,454	1,088	34,366	114,578	3.3
		1976	36,982	4,471	32,512	119,854	4.0
	401 Maritengngae	1973	4,876	114	4,762	11,279	2.4
		1974	5,233	699	4,534	14,664	3.2
		1975	8,649	40	8,609	31,689	3.7
		1976	9,587	713	8,874	36,422	4.1

Table 6.2.(5) Informations on Production Conditions of Wet Season Paddy

Kecamatan		Year	P.A./1 (ha)	D.A./2 (ha)	H.A./3 (ha)	Production (t)	t/ha
402	Panca Lantang	1973	4,597	1,315	3,282	9,150	2.7
		1974	3,400	199	3,201	9,639	3.0
		1975	3,648	524	3,124	10,143	3.2
		1976	3,621	454	3,167	11,366	3.6
403	Tellulimpue	1973	1,660	752	909	2,610	2.9
		1974	827	0	827	2,779	3.4
		1975	1,673	411	1,262	4,194	3.3
		1976	1,774	144	1,630	6,568	3.6
404	Watangpulu	1973	3,039	37	3,002	9,032	3.0
		1974	2,206	122	2,084	6,922	3.3
		1975	2,588	13	2,575	8,867	3.4
		1976	2,241	193	2,048	5,312	2.6
405	Baranti	1973	3,075	950	2,125	6,683	3.1
		1974	2,060	151	1,959	6,688	3.4
		1975	2,979	3	2,976	10,969	3.7
		1976	2,754	87	2,668	6,630	2.5
406	Pancarijang	1973	2,861	1,197	1,664	7,225	4.1
		1974	1,974	219	1,755	5,995	3.4
		1975	4,631	98	4,534	14,262	3.1
		1976	4,852	1,444	3,408	9,131	2.7
407	Dua Pitue	1973	9,727	2,462	7,265	9,229	1.3
		1974	10,024	0	10,024	37,041	3.7
		1975	11,286	0	11,286	34,454	3.0
		1976	12,153	1,436	10,717	44,426	4.2

Source: From the agriculture office of 4 Kabupatens; Sidrap, Soppeng, Wajo and Bone.

Table 6.3.(1) Production of Dry Season Paddy

	Kecamatan		Production		Kecamatan		Production	
1.	Wajo		76	2,241	206	Cine	76	-
			77	361			77	504
	101	Tempe	76	0	207	Ponre	76	-
			77	0			77	150
	102	Belawa	76	1,950	208	Ulaweng	76	-
			77	240			77	137
	103	Tanasitolo	76	94	209	Tellusiatinge	76	-
			77	95			77	827
	104	Majualeng	76	14	210	Ajangale	76	-
			77	0			77	0
	105	Pammana	76	0	211	Duaboccoe	76	-
			77	0			77	309
	106	Sabbangparu	76	77	212	Cenrana	76	-
			77	0			77	9
	107	Maniangpajo	76	46	213	Lappariaja	76	-
			77	6			77	5,621
	108	Pitumpanua	76	0	214	Lamuru	76	-
			77	0			77	646
	109	Sajoanging	76	0	215	Mare	76	-
			77	0			77	0
	110	Takkalala	76	60	216	Libureng	76	-
			77	56			77	127
					217	Tonra	76	-
2.	Bone		76	-			77	0
			77	12,455	218	Bontocani	76	-
	201	Tanete Riatang	76	-			77	345
			77	304	219	Kahu	76	-
	202	Barebbo	76	-			77	369
			77	1,602	220	Salomekko	76	-
	203	Palakka	76	-			77	0
			77	142	221	Kajuara	76	-
	204	Awangpone	76	-			77	83
			77	1,280				
	205	Sibulue	76	-	3.	Soppeng	76	60,993
			77	-			77	59,943

* 1976: 1975/76, 1977: 76/77

Table 6.3.(2) Production of Dry Season Paddy

Kecamatan		Production	Kecamatan		Production
3. Soppeng		76 60,993 77 59,943	401	Maritangngae	76 33,942 77 50,872
301	Lalabata	76 20,992 77 19,715	402	Pancalautang	76 4,747 77 5,797
302	Marioriawa	76 4,848 77 7,959	403	Tellulimpue	76 4,877 77 6,650
303	Lilirilau	76 1,977 77 811	404	Watangpulu	76 7,692 77 6,187
304	Liliriaja	76 27,970 77 26,130	405	Baranti	76 9,332 77 11,161
305	Marioriwawo	76 5,206 77 2,330	406	Pancarigang	76 10,707 77 11,842
			407	Dua Pitue	76 22,220 77 26,315
4. Sidrap		76 93,516 77 118,747			

Source: From the agricultural office of 4 Kabupatens, Sidrap, Soppeng, Wajo and Bone.

Table 6.4 Population per Ha of Planted and Harvested Area of Wet Season Paddy (1977)

	Kecamatan	P.A. (ha)	H.A. (ha)	Population (x1,000)	P/P.A. (person/ha)	P/P.A. (person/ha)
1.	Wajo	64,510	31,598	372.1	6	12
	101 Tempe	106	91	45.5	430	500
	102 Belawa	4,467	2,514	36.8	8	15
	103 Tanasitolo	3,972	573	35.2	9	61
	104 Majualeng	9,402	3,108	33.5	4	11
	105 Pammana	3,468	1,939	38.4	11	20
	106 Sabbangparu	2,492	1,052	41.3	17	39
	107 Maniangpajo	5,978	2,697	20.9	4	8
	108 Pitumpanua	6,284	3,236	38.2	6	12
	109 Sajoanging	15,421	7,998	37.6	3	5
	110 Takkalala	12,920	8,390	44.6	4	5
2.	Bone	73,284	61,045	622.3	8	10
	201 Tanete Riatang	2,467	2,423	52.2	21	22
	202 Barebbo	5,350	5,199	23.4	4	5
	203 Palakka	4,377	4,377	33.9	9	9
	204 Awangpone	4,729	4,603	34.1	7	7
	205 Sibulue	5,726	5,638	25.5	4	5
	206 Cina	4,900	4,825	17.3	4	4
	207 Ponre	1,698	1,503	12.7	8	8
	208 Ulaweng	762	747	44.6	59	60
	209 Tellusiatinge	4,067	3,231	45.2	11	14
	210 Ajangale	4,375	3,075	47.9	11	16
	211 Dua boccoe	2,612	1,990	40.4	15	20
	212 Cenrana	3,954	3,378	24.4	6	7
	213 Lappa Riaja	5,345	5,273	46.5	9	9
	214 Lamuru	1,659	1,574	37.0	22	24
	215 Mare	4,217	4,112	18.9	5	5
	216 Libureng	3,927	2,548	20.6	5	8
	217 Tonra	2,075	845	15.4	7	18
	218 Bontocani	1,646	1,574	12.6	8	8
	219 Kahu	5,464	2,776	27.1	5	10
	220 Salomekko	2,175	765	18.0	8	24
	221 Kajuara	1,759	690	24.6	14	36
3.	Soppeng	21,039	16,526	241.0	11	15
	301 Lalabata	6,233	5,524	64.1	10	12
	302 Mario riawa	3,780	1,992	30.4	8	15
	303 Lilirilau	2,724	1,591	51.7	19	32
	304 Liliriaja	6,479	5,633	49.7	8	9
	305 Marioriwao	1,822	1,786	45.1	25	25
4.	Sidrap	36,982	32,512	196.0	5	6
	401 Maritengngae	9,587	8,874	36.2	4	4
	402 Pancalautang	3,621	3,167	18.9	5	6
	403 Tellulimpue	1,774	1,630	16.2	9	10
	404 Watangpulu	2,241	2,048	15.5	7	8
	405 Baranti	2,754	2,668	25.0	9	9
	406 Pancarijang	4,852	3,408	33.5	7	10
	407 Dua Pitue	12,153	10,717	50.5	4	5

* Sidrap: 1976 M1 = P/P.A. M2 = P/H.A.

Table 6.5 Surplus and Deficit of Paddy (1977)

	Kecamatan	Population (person)	Production (tons)	Concumption /1		Surplus	
				Case 1	Case 2	Case 1	Case 2
1.	Wajo						
	101 Tempe	45,500	182	9,100	11,380	8,920	11,198
	102 Belawa	36,800	9,314	7,360	9,200	1,950	114
	103 Tanasitolo	35,200	945	7,040	8,800	6,100	7,855
	104 Majauleng	33,500	8,275	6,700	8,380	1,580	105
	105 Pammana	38,400	5,062	7,680	9,600	2,620	4,538
	106 Sabbangparu	41,300	2,904	8,260	19,330	5,360	7,426
	107 Maniangpajo	20,900	6,542	4,180	5,230	2,360	1,312
	108 Pitumpanua	38,200	8,599	7,640	9,550	960	951
	109 Sajonging	37,600	19,991	7,520	9,400	12,470	10,591
	110 Takkalala	44,600	23,209	8,920	11,150	14,290	12,059
2.	Bone						
	201 Tanete Riatang	52,200	5,719	10,440	13,050	4,721	7,331
	202 Barebbo	23,400	18,123	4,680	5,850	13,443	12,273
	203 Palakka	33,900	9,792	6,780	8,480	3,012	1,312
	204 Awangpone	34,000	15,030	6,800	8,500	8,230	6,530
	205 Sibulue	25,500	14,865	5,100	6,380	9,770	8,485
	206 Cina	17,300	12,742	3,460	4,330	9,280	8,412
	207 Ponre	12,700	3,387	2,540	3,180	850	207
	208 Ulaweng	44,600	1,445	8,920	11,150	7,480	9,705
	209 Tellusiatinge	45,200	7,998	9,040	11,300	1,040	3,302
	210 Ajangale	47,900	6,242	9,580	11,975	3,340	5,733
	211 Dua Boccoe	40,400	4,637	8,080	10,100	3,440	5,463
	212 Cenranae	24,300	6,613	4,860	6,075	1,753	538
	213 Lappa Riaja	46,500	19,299	9,300	11,625	10,000	7,674
	214 Lamuru	37,000	4,550	7,400	9,250	2,850	4,700
	215 Mare	18,900	7,504	3,780	4,725	3,720	2,779
	216 Libureng	20,600	5,096	4,120	5,150	980	54
	217 Tonra	15,400	1,462	3,080	3,850	1,620	2,388
	218 Bontocani	12,600	3,414	2,520	3,150	890	264
	219 Kahu	27,100	5,989	5,420	6,775	570	786
	220 Salomekko	18,000	1,316	3,600	4,500	2,280	3,184
	221 Kajuara	24,600	1,470	4,920	6,150	3,450	4,680
3.	Soppeng						
	301 Lalabata	64,100	46,020	12,820	16,025	33,200	29,995
	302 Mario Riawa	45,100	14,912	9,020	11,275	5,890	3,637
	303 Lili Rilau	51,700	6,545	10,340	12,925	-3,800	-6,380
	304 Lili Riaja	49,700	50,115	9,940	12,425	40,180	37,690
	305 Mario Riwawo	45,100	9,396	9,020	11,275	382	-1,879
4.	Sidrap						
	401 Maritengngae	36,200	87,294	7,240	9,050	80,054	78,244
	402 Pancalautang	18,900	17,163	3,780	4,725	13,380	12,435
	403 Telluimpue	16,200	13,218	3,240	4,050	9,980	9,168
	404 Watangpulu	15,500	11,499	3,100	3,875	8,400	7,624
	405 Baranti	25,000	7,746	5,000	6,250	2,750	1,496
	406 Pancariang	33,500	20,973	6,700	8,375	14,270	12,598
	407 Dua Pitue	50,500	70,741	10,100	12,625	60,640	58,116

/1: Case 1 = per capita consumption = 120 ÷ 0.6 = 200 kg/person year of paddy
Case 2 = per capita consumption = 150 ÷ 0.6 = 250 kg/person year of paddy

Table 7.1 Population Increase

Population : x 1,000
Increase Ratio: %

Area	Item	1971	1972	1973	1974	1975	1976	1977
Objective 4 Kab.	Population	1,271	1,338	1,331	1,337	1,385	1,422	1,431
	Popul. 1				2.0%			
	Increase 2						1.7%	
Other Kab.	Population	3,918	3,954	3,965	4,002	4,038	4,234	4,279
	Popul. 1				1.5%			
	Increase 2						2.8%	
South Sulawesi	Population	5,189	5,292	5,296	5,339	5,423	5,656	5,710
	Popul. 1				1.6%			
	Increase 2						2.6%	

(1) Population Increase

1: Average annual increase ratio of population during 1971 - 1977
2: Average annual increase ratio of population during 1975 - 1977

(2) Objective 4 Kab: Wajo, Bone, Soppeng and Sidrap.

Source: "Perkembangan Penduduk Sul-Sel:, Kantor Sensus dan Statistik, Propinsi Sulawesi Selatan

Table 7.2 Per Capita Consumption of Fish in Whole South Sulawesi

Item		1971	1972	1973	1974	1975	1976	1977
Production	(1,000 t)	124	112	121	146	156	156	189
Population	(1,000)	5,189	5,292	5,296	5,339	5,423	5,656	5,710
Per capita Consumption	(kg/person)	24.0	21.2	22.8	26.3	26.9	27.6	33.0

Source: 1) Population: "Perkembangan Penduduk Sul-Sel"
Kantor Sensus dan Statistik, Propinsi Sul-Sel.

2) Production: "Kanwil Dinas Perikanan Tk. I Sul-Sel"
Kantor Sensus dan Statistik Propinsi Sul-Sel.

Table 7.3 Forecasting of Fish Demanded

(Unit: 1,000 t)

Area		1980	1985	1990	1995	2000
Objective 4 Kab.	Objective Area	32	35	39	43	47
	Other Area	14	15	17	18	19
	Total	46	50	56	61	68
Other Kab.		136	151	166	184	202
South Sulawesi		182	201	222	245	270

(1) Objective 4 Kab.: Wajo, Bone, Soppeng and Sidrap

(2) Objective Area : Area within the objective area of the Central South Sulawesi Water Resources Development Project (29 Kecamatan)

(3) Per Capita Consumtpion : 30 kg/person year

(4) Annual population increase ratio: 2.0%

Table 7.4 Fish Production in 1977

(Unit: t)

Kinds	Objective Area	Other Area	South Sulawesi
1. Lake Fishing	13,704	0	13,704
2. Others	2	174,881	174,883
Total	13,706	174,881	188,587

(1) Others: Almost all quantities of fish were produced in the sea and in the brackish culture

(2) Objective Area: 29 Kecamatan

Source: "Kanwil Dinas Perikanan Tk. I Sul-Sel", Kantor Sensus dan Statistik Propinsis Sul-Sel.

Table 7.5 Balance of Supply and Demand in 1977

(Unit: 1,000 t)

Supply & Demand		Objective Area	Other Area	South Sulawesi
Supply	Lake	14	0	14
	Others	18	150	* 168
Demand		32	150	182

* Total Production is 175 x 10^3 t. Therefore, surplus (174 - 168 = 6) will be transfered to the other area of South Sulawesi.

Table 7.6 Power Demand Forecast in South Sulawesi

(Unit: 10^6 Kwh)

Method of Forecasting		1975	1978	1980	1985	1990	1995	2000
PLN Forecast *1			270	415	711	1,159	-	-
JICA *1 Forecast	Microscopic *3	(58)	-	(356)	(598)	(918)	-	-
	Approach	-	231	399	711	1,159	-	-
	Macroscopic Approach		276	420	865	1,240	-	-
BAPPENAS *2 Forecast	Microscopic Approach	60	-	320	374	1,047	1,740	2,831
	Macroscopic Approach	102	-	296	580	969	1,500	2,367

*1 PLN & JICA Forecast: for Ujung Pandang Area (including the western coastal area)

*2 BAPPENAS Forecast : for whole South Sulawesi

*3 Power Demand for only Ujung Pandang

Source: 1) PLN & JICA Forecast: "Report on Feasibility Study of Bakaru Hydroelectric Power Development Project, Sadang River System, South Sulawesi, September 1977 JICA"

2) BAPPENAS Forecast : "Skema Pengembangan Kelistrikan Sulawesi Selatan Menjelang tahun 2000, by Program Perencanaan Nasional FEUI - BAPPENAS, 1977"

Table 7.7 Power Supply Forecast in South Sulawesi

Contents			1975	1978	1980	1985	1990	1995	2000
Actual		Installed Capacity (10^3 kW) *1	-	48	48	48	48	48	48
		Supply (10^6 kWh)	-	336	336	336	336	336	336
Planned	Diesel	Installed Capacity (10^3 kW) *2	-	-	14	119	215	215	215
		Supply (10^6 kWh)	-	-	98	834	1,507	1,507	1,507
	Hydro	Installed Capacity (10^3 kW) *3	-	-	-	204	266	266	266
		Supply (10^6 kWh)	-	-	-	1,430	1,864	1,864	1,864
Total Supply (10^6 kWh)			-	336	434	2,600	3,707	3,707	3,707

* Method of Estimation

(1) Supply = (Installed Capacity) x (1 - Loss Ratio) x 8,760^h/year
* Loss Ratio = 0.2
: Informations admitted officially by PLN and other organization

(2) Assumption
a) Actual installed capacity, in 1978, will remain the same level from 1978 to 2000
b) Planned installed capacity by Diesel Power, will reach target capacity in 1990
c) Planned installed capacity by Hydropower will reach target capacity in 1990 (Planned capacity is including "Bakaru Hydroelectric Power Development Project")

*1: "Data-data Mesin Pembangkit PLN Wilayah VIII", PLN, 1978

*2: "Diesel Power Development Plan in future" PLN, 1979

*3: "Planned capacity of Bakaru Project"

Table 7.8 Balance of Supply and Demand in South Sulawesi

Year	Population (1000)	Demand		Supply												Balance of Supply and Demand (S - D)		
				Case 1			Case 2					Case 3						
								Diesel										
		Total Demand (10^3MWh)	Per Capita Energy Demand (kWh)	Hydro (10^3MWh)	Diesel (10^3MWh)	Total (10^3MWh)	Hydro (10^3MWh)	Actual (10^3MWh)	Planned (10^3MWh)	Total (10^3MWh)	Total (10^3MWh)	Hydro (10^3MWh)	Diesel (10^3MWh)	Total (10^3MWh)	Case 1 (10^3MWh)	Case 2 (10^3MWh)	Case 3 (10^3MWh)
1978	5,800	250	43	0	336	336	0	336	0	336	336	0	336	336	86	86	86
1980	6,030	320	53	0	336	336	0	336	98	434	434	0	336	336	16	114	16
1985	6,660	374	56	1,430	0	1,430	1,430	336	834	1,170	2,600	1,430	0	1,430	1,056	2,226	1,056
1990	7,350	1,047	142	1,864	0	1,864	1,864	336	1,507	1,843	3,707	1,864	0	1,864	817	2,660	817
1995	8,116	1,740	214	1,864	0	1,864	1,864	336	1,507	1,843	3,707	1,864	0	1,864	124	1,967	124
2000	8,960	2,831	316	1,864	0	1,864	1,864	336	1,507	1,843	3,707	2,831	0	2,831	-967	876	0

*1: Population increase ratio is annually 2.0%

*2: Quantities demanded are estimated with the planned and forecasted value by PLN, BAPPENAS

*3: Supply
- Case 1: Power output is kept at the present level by the diesel power plant from 1978 to 1985. And then after 1985, increased demand of energy is satisfied with the implementation of Bakaru hydropower project.
- Case 2: All energy planned by PLN are supplied not only by planned hydropower project but also by the planned diesel power project.

Table 7.9 Present Energy Consumption (1978)

Region	Energy x 10^3 kWh	Population	Per Capita Energy (kWh/pers.)
Ujung Pandang	270,000	580,000	466
Parepare	9,227	79,000	117
Sengkang (A)	1,194	45,500	26
Watan Soppeng (B)	605	64,000	9
(A) + (B)	1,799	109,500	17

Source: (1) Energy : PLN Wilayah VIII
Branch office - Parepare, Sengkang, Watan Soppeng
(Ujung Pandang: Report on Feasibility Study of Bakaru Hydroelectric Power Development Project "Sept 1977 JICA")

(2) Population: "Kepala Kantor Sensus & Statistik, Wajo, Soppeng 1977"

Table 7.10 Forecasting of Energy Demand in the Objective Area

Year	Population (10^3)				Case 1								Case 2							
					Per Capita Energy Demand ($\frac{kWh}{person \cdot year}$)				Total Demand (10^3kWh)				Per Capita Energy Demand ($\frac{kWh}{person \cdot year}$)				Total Demand (10^3kWh)			
	S.K.	W.S.	Others	Total	S.K.	W.S.	Others	Total	S.K.	W.S.	Others	Total	S.K.	W.S.	Others	Total	S.K.	W.S.	Others	Total
	(4.3)	(6.1)	(89.6)	(100.0)																
1978	45	64	947	1,056	26	10	0	1.7	1,170	640	0	1,810	26	10	0	1.7	1,170	640	0	1,810
1980	45	64	954	1,063	31	12	4	5.6	1,395	768	3,816	5,979	30	14	4	5.7	1,350	896	3,816	6,062
1985	50	71	1,053	1,174	48	18	13	14.8	2,400	1,278	13,689	17,367	39	23	13	14.7	1,950	1,633	13,689	17,272
1990	55	79	1,162	1,296	73	28	22	24.5	4,015	2,212	25,564	31,791	48	32	22	23.7	2,640	2,528	25,564	30,732
1995	61	87	1,283	1,431	113	43	32	36.1	6,893	3,741	41,056	51,690	58	42	32	33.7	3,538	3,654	41,056	48,248
2000	67	96	1,417	1,580	173	67	41	48.2	11,591	6,432	58,097	76,120	67	51	41	42.7	4,489	4,896	58,097	67,482

*1: S.K. = Singkang, W.S. = Watansoppeng

*2: Population increase ratio is annually 2.0%

*3: Method of demand forecasting

Case 1: Per capita energy demand, in future, is estimated with the exponential curve shown below.

$$\alpha_t = \alpha_o (1 + r)^t$$

t : year-1978

α_o: Actual per capita energy demand in 1978

α_t: Per capita energy demand in the year (+ 1978)

r : 0.09

Increase ratio of per capita energy demand excluding the increased demand through the completion of Bakaru hydropower development project, assuming that the energy demand in the objective area increases paralleled with the average increase ratio of estimated energy demand, without Bakaru hydropower project in whole South Sulawesi by PLN and other organizations.

Case 2: Per capita energy demand, in future, is estimated with the linear regression curve shown below

$$\alpha_t = r.t + \alpha_o \quad (r = 1.86)$$

Basic consideration of this method is the same as that of Case 1.

Table 8.1 Planned Sectoral Projects

	Plan			Construction Period	Construction Cost	O-M Cost	Gross/1 Benefit
	Irrigation		(ha)	(years)	(US$10^3)	(US$10^3)	(US$10^3)
1.	Bila	Wet S.	10,500	6	42,000	511	11,760
		Dry S.	6.600				
2.	Boya	Wet S.	10,000	5	23,900	372	3,803
		Dry S.	9,800				
3.	Langkemme	Wet S.	5,000	5	22,400	272	4,603
		Dry S.	3,700				
4.	Lawo	Wet S.	3,000	4	10,500	133	1,959
		Dry S.	1,800				
5.	Cenranae	Wet S.	2,300	5	13,600	220	3,456
		Dry S.	2,300				
6.	Gilirang	Wet S.	10,000	6	65,200	782	15,712
		Dry S.	10,000				
7.	Mong-1	Wet S.	26,000	6	104,400	1,323	36,504
		Dry S.	26,000				
8.	Mong-2	Wet S.	26,000	6	104,400	1,323	29,744
		Dry S.	26,000				
9.	Walimpong-1	Wet S.	26,000	6	105,900	1,341	36,504
		Dry S.	26,000				
10.	Walimpong-2	Wet S.	26,000	6	105,900	1,341	36,504
		Dry S.	26,000				
11.	Walimpong-3	Wet S.	26,000	6	105,900	1,341	36,504
		Dry S.	26,000				
12.	Sanrego	Wet S.	10,000	6	37,500	456	15,782
		Dry S.	8,600				
13.	Padangeng	Wet S.	4,200	4	20,900	282	2,935
		Dry S.	4,200				
	Flood Control						
1.	Bila (without Irrig. Plan)			5	19,680	89	2,397
2.	Bila (with Irrig. Plan)			5	19,680	89	2,987
3.	Mong-2			5	29,760	134	3,856
4.	Walimpong-1			5	26,800	121	3,920
5.	Walimpong-2			5	22,080	99	4,413
6.	Walimpong-3			5	21,400	96	4,497
7.	Cenranae			5	15,792	72	2,046
	Hydro Power		(kW)				
1.	Mong-1		17,100	4	17,646	209	1,301
2.	Mong-2		16,800	4	17,646	209	1,267
3.	Walimpong-1		31,600	4	29,309	209	4,675
4.	Walimpong-2		26,000	4	23,317	209	3,836
5.	Walimpong-3		26,000	4	23,317	209	3,836

/1: Gross benefit at full development stage

Table 8.2 Allocation Method of Multipurpose Dam Cost of Each Sector

(Unit: US$10^3)

	Annual Benefit	P.W.G. Benefit /1	Alloca-tion R. /2	Const. Cost /3	Allo. C. Cost /4	O-M Cost /5	Allo. O-M Cost /6
Mong-1							
Irrigation	36,504	126,102	95.4		70,909		5,753
Flood Control	0	0	0.0	106,900	0	1,283	0
Hydropower	1,304	6,115	4.6		3,419		277
Mong-2							
Irrigation	29,744	100,542	83.5		62,064		5,035
Flood Control	3,856	13,883	11.5	106,900	8,548	1,283	693
Hydropower	1,267	5,955	5.0		3,716		302
Walimpong 1							
Irrigation	36,504	126,102	77.8		75,299		6,106
Flood Control	3,920	14,113	8.7	139,200	8,420	1,670	683
Hydropower	4,675	21,973	13.5		13,066		1,060
Walimpong 2							
Irrigation	36,504	126,102	78.8		76,267		6,185
Flood Control	4,413	15,888	9.9	139,200	9,582	1,670	777
Hydropower	3,836	18,029	11.3		10,936		887
Walimpong 3							
Irrigation	36,504	126,102	78.7		76,170		6,117
Flood Control	4,497	16,189	10.1	139,200	9,775	1,670	793
Hydropower	3,836	18,029	11.2		10,840		879

/1: P.W.G. Benefit = Present Worth of Gross Benefit (12%)
/2: Allocation R = Allocation Rate of Multipurpose Dam Cost
/3: Const. Cost = Construction Cost of Multipurpose Dam
/4: Allo. C. Cost = Allocated Construction Cost of Multip. Dam
/5: O-M Cost = O-M Cost of Multipurpose Dam
= 1.2% of Construction Cost of Multipurpose Dam
/6: Allo. O-M Cost = Allocated O-M Cost of Multipurpose Dam
/7: Construction Period of Irrigation = 6 years
Flood = 5 years
Hydropower = 4 years

Table 8.3 Compound and Multipurpose Dam Plan

(Unit: US$10^3)

Plan	Gross /1 Benefit	Construction Cost	Allocated Construction Cost	O-M Cost	Allocated O-M Cost
Compound					
Bila					
Irrigation	11,760	42,000	-	511	-
Boya					
Irrigation	3,803	23,900	-	372	-
Bila					
Flood Control with Irrigation	2,987	19,680	-	89	-
Multipurpose Dam					
Mong Dam					
Case 1					
Irrigation	36,504	104,400	101,983	1,323	1,224
Hydro Power	1,301	17,646	4,917	209	59
Case 2					
Irrigation	29,744	104,400	89,262	1,323	1,071
Flood Control	3,856	29,760	12,294	134	148
Hydro Power	1,267	17,646	5,344	209	64
Walimpong Dam					
Case 1					
Irrigation	36,504	105,900	108,298	1,341	1,299
Flood Control	3,920	26,800	12,110	121	145
Hydro Power	4,675	29,309	18,792	209	226
Case 2					
Irrigation	36,504	105,900	109,690	1,341	1,316
Flood Control	4,413	22,080	13,781	99	165
Hydro Power	3,836	23,317	15,729	209	189
Case 3					
Irrigation	36,504	105,900	109,550	1,341	1,314
Flood Control	4,497	21,400	14,059	96	169
Hydro Power	3,836	23,317	15,591	209	187

/1: Gross benefit at full development stage

Table 8.4 Economic Evaluation of Each Plan

(Unit: US$10^3)

	Plan	Annual Benefit /1	Benefit (B) /2	Cost (C) /2	(B)-(C) /2	(B)/(C) /2	IRR
Sectoral Project							
	Irrigation						
1.	Bila	11,760	46,404	31,762	14,641	1.46	16.0
2.	Boya	3,803	16,742	20,080	-3,338	0.83	10.0
3.	Langkemme	4,603	21,857	18,420	3,437	1.19	13.5
4.	Lawo	1,959	10,363	9,188	1,175	1.13	13.0
5.	Cenranae	3,456	14,679	11,536	3,143	1.27	14.5
6.	Gilirang	15,712	59,538	49,253	10,285	1.21	14.0
7.	Mong-1	35,181	120,559	146,308	-25,749	0.82	10.2
8.	Mong-2	28,421	94,999	136,745	-41,746	0.70	9.1
9.	Walimpong-1	35,163	120,483	152,050	-31,567	0.79	10.0
10.	Walimpong-2	35,163	120,483	153,097	-32,614	0.79	9.9
11.	Walimpong-3	35,163	120,483	152,992	-32,509	0.79	9.9
12.	Sanrego	15,782	59,803	28,357	31,446	2.11	18.5
13.	Padangeng	2,935	13,938	17,338	-3,400	0.80	9.5
	Flood Control						
1.	Bila (without Irrig. Plan)	2,397	11,266	13,614	-2,348	0.82	10.0
2.	Bila (with Irrig. Plan)	2,987	13,600	13,614	-14	1.00	12.0
3.	Mong-2	3,722	13,253	29,195	-15,942	0.45	6.1
4.	Walimpong-1	3,799	13,544	27,072	-13,528	0.50	6.7
5.	Walimpong-2	4,314	15,423	25,892	-52,941	0.60	8.2
6.	Walimpong-3	4,401	15,738	24,917	-9,179	0.63	8.3
7.	Cenranae	2,046	9,616	10,925	-1,309	0.88	10.5
	Hydro Power						
1.	Mong-1	1,092	5,132	15,661	-10,529	0.33	3.4
2.	Mong-2	1,058	4,972	15,983	-11,011	0.31	3.1
3.	Walimpong-1	4,416	20,990	33,997	-13,007	0.62	7.6
4.	Walimpong-2	3,627	17,046	27,632	-10,586	0.62	7.6
5.	Walimpong-3	3,627	17,046	27,528	-10,482	0.62	7.6
Compound Project							
1.	Bila-Boya Plan	18,550	76,746	65,456	11,289	1.17	13.5
Multipurpose Dam Project							
1.	Mong-1	36,273	125,691	161,969	-36,278	0.78	9.8
2.	Mong-2	33,201	113,224	181,923	-68,699	0.62	8.3
3.	Walimpong-1	43,428	155,017	213,119	-58,102	0.73	9.3
4.	Walimpong-2	43,104	152,952	206,876	-53,924	0.74	9.4
5.	Walimpong-3	39,564	153,267	205,437	-52,170	0.75	9.4

/1: Annual benefit at full development stage
/2: Calculated with 12% of discount rate

Table 8.5.(1) Comparison of the Proposed Single, Compound and Multipurpose Plan
(from viewpoint of effectiveness and easiness in implementation)

Index		Bila - Boya Compound		Lang-kemme	Lawo	Cenra-nae	Gili-rang	Walanae Multipurpose		San-rego	Padan-geng
		Bila	Boya					West	East		
1. IRR (Single, Compound, Multi)	(%)	13.5		13.5	13.0	14.5	14.0	9.4		18.5	9.5
2. IRR (Exclusive Sectoral Plan)	(%)	16.0	10.0	13.5	13.0	14.5	14.0	9.4		18.5	9.5
3. B - C (Single, Compound, Multi)	(US$1,000)	11,289		3,437	1,175	3,143	10,285	-25,592	-28,032	31,446	-3,400
4. Irrigable Area In Wet Season (Aw)		10,500	10,000	5,000	3,000	2,300	10,000	26,000		10,000	4,200
5. Irrigable Area In Dry Season (Ad)		6,600	9,800	3,700	1,800	2,300	10,000	26,000		8,600	4,200
6. Regional Gap & Limiting Factors											
1. Population (1977)	(x 1,000)	56	87	114	114	34	71	143	127	48	64
2. Average Annual Increase Ratio of Population (1974-77)		7.5	2.0	1.0	1.0	4.0	4.0	4.0	2.0	-0.5	1.0
3. Total Area (1977)	(km^2)	497	1,998	599	599	231	552	511	491	624	400
4. Population Density (1977)	(person/km^2)	113	44	190	190	147	129	280	259	77	16
5. Paddy production in wet season (1976)	(x 1,000 t)	4	52	53	53	16	43	10	17	7	22
6. Paddy production in dry season (1976)	(x 1,000 t)	0	24	23	23	0	0	30	0	0	21
7. Paddy Production increase in wet season (Annual Average)	(x 1,000 t)	-9	10	9	9	-12	-24	-5	-11	4	4
8. Paddy Productivity per Ha in wet season (1976)	(t/ha)	1.6	3.8	3.6	3.6	2.9	2.6-2.9	1.9-5.0	2.3-2.7	1.3-1.9	3.6
9. Paddy Productivity increase in wet season (Annual Average)		-	+	+	+	-	-	+	-	+	+
10. Paddy Damaged Ratio in wet season (1976)		78	20	4	4	40	32	1	30	41	5
11. Net Farm Income (1977)	(Rp.1,000)	70-236	127-315	208-304	208-304	168	168-262	48-304	41-116	183-189	208
12. Population per paddy Planted Area (1976)	(person/ha)	4-9	4-8	8-10	8-10	4	3-4	8-19	11-15	5	10

Table 8.5.(2) Comparison of the Proposed Single, Compound and Multipurpose Plan
(from viewpoint of effectiveness and easiness in implementation)

Index		Bila - Boya Compound		Langkemme	Lawo	Cenranae	Gilirang	Walanae Multipurpose		Sanrego	Padangeng
		Bila	Boya					West	East		
13. Population per paddy Harvested Area (1976)	(person/ha)	8-61	5-15	9-12	9-12	11	5-11	9-39	16-20	8-10	12
14. Balance of Paddy Demand and Supply (1976)	(tons)	-7	58	68	68	-0.1	10	25	-16	-1	30
15. Accessibility to Ujung Pandang	(hours)	4.0	4.0	3.5	3.5	4.5	4.5	4.0	5.0	7.0	4.0
16. Accessibility to Parepare	(hours)	1.0	1.0	2.5	2.5	2.0	2.0	2.0	2.5	8.0	1.5
17. Main Road Conditions		Good	Good	Good	Good	Good	Good	Good	Good	Bad	Good
18. Access Road Conditions		Bad	Bad	Good	Good	Bad	Bad	Bad	Bad	Bad	Bad
19. Policy of Head of Each Kecamatan		Irrig. Flood	Irrig. Flood	Irrig.	Irrig.	Irrig.	Irrig.	Flood	Irrig.	Irrig. Road	Irrig.

(1): Main Kec. influenced in economic and social activities through the completion of Irrigation Plan

a) Bila : Maniangpajo, Tanasitolo (Main area of socio-economic activities of Dua Pitue and Belawa is included in Boya area)
b) Boya : Dua Pitue, Belawa
c) Langkemme: Liliriaja, Lalabata
d) Lawo : Liliriaja, Lalabata
e) Cenranae : Majauleng
f) Gilirang : Sajoanging, Majauleng
g) Walanae (West) (Left side of Walanae River) : Lilirilau, Liliriaja, Sebanparu
h) Walanae (East) (Right side of Cenranae River): Pammana, Ajangale, Dua Boccoe
i) Sanrego : Kahu, Libureng
j) Padangeng: Lalabata

(2): Value of each index is estimated for the above-mentioned Kecamatan

(3): Walanae Multipurpose Plan and Bila-Boya compound plan include flood control and Hydro Power Plan

(4): 6-7 and 6-9 : Wajo (1975-79), Bone (1976-77), Soppeng (1974-77), Sidrap (1973-76)

(5): 6-14 : Per Capita Consumption = 150 kg/year

(6): 3 (B-C) : Discount Rate = 12.0%

Table 8.6 Project Assessment (Order of Priority)

View point	Bila-Boya Comound	Lang-kemme Irrig.	Lawo Irrig.	Cenranae Irrig.	Gilirang Irrig.	Walanae Multi Purpose	Sanrego Irrig.	Pada-ngeng Irrig.	Cenranae Flood Control	Inland Fisheries
1. Economic Growth										
IRR	1	2	2	2	2	3	1	3	3	
B-C	1	3	3	3	2	4	1	4	4	
2. Equalization of Development Gap	1	3	3	2	2	1	1	3	3	1 Fishermen
3. Social Welfare	3	3	3	3	3	2	1 Isolated	3	3	1 Protein
4. Limiting Factors (Constraints)										
Economic	2	1	1	4 power	2	2	4 Road	1	1	1
Social	2	1	1	2	2	4	2	1	1	1
Techno-logical *	2	1	1	4 pump	2	4	2	1	1	1
5. Role as a core of the development in objective area	1	1	3	2	3	1	1	3	3	3

* Including technological transfer and technology itself

Fig. 2.1 Kabupaten and Kotamadya Boundaries in South Sulawesi

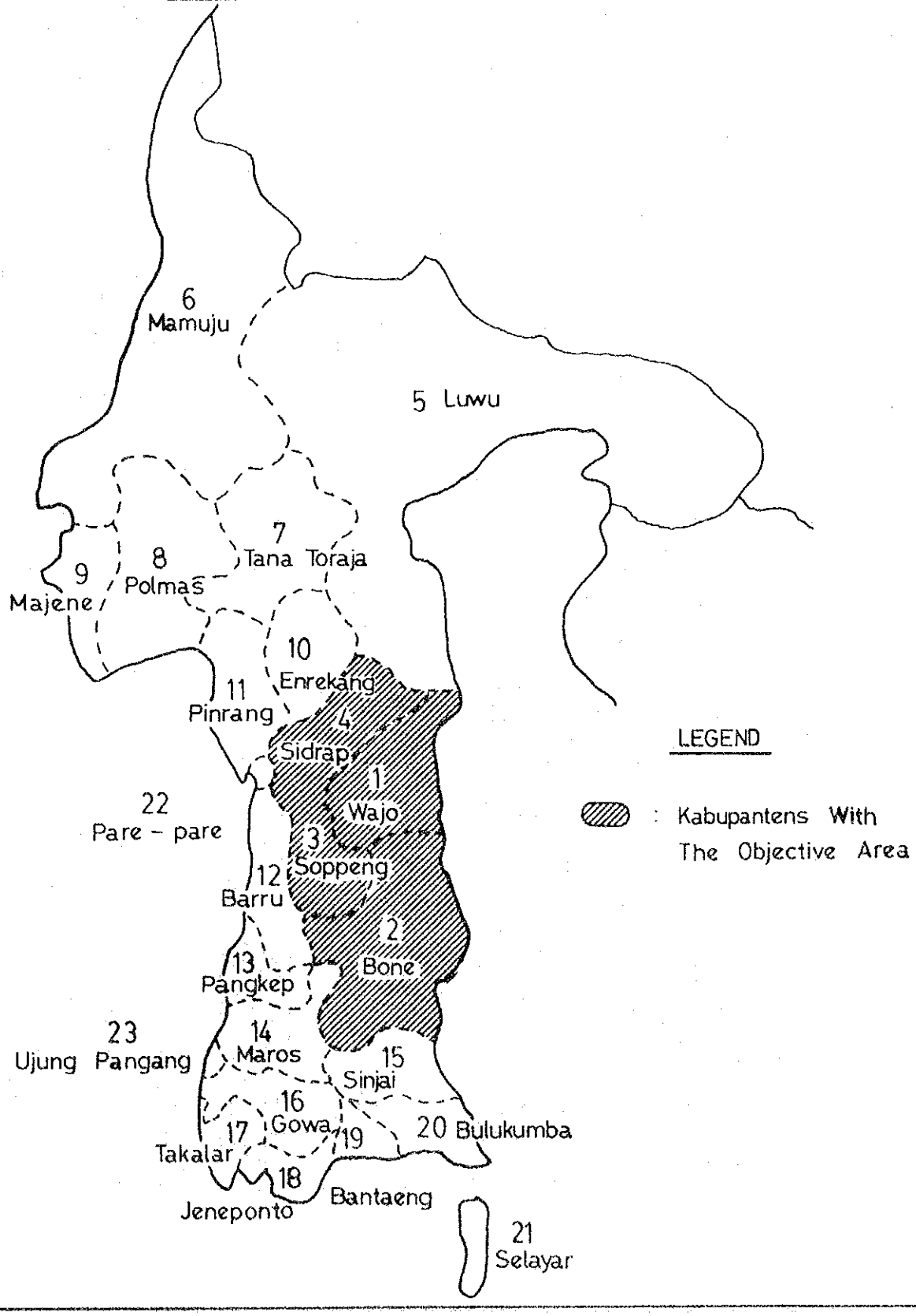


Fig. 2.2 Population Density (P.D.)

(1976)

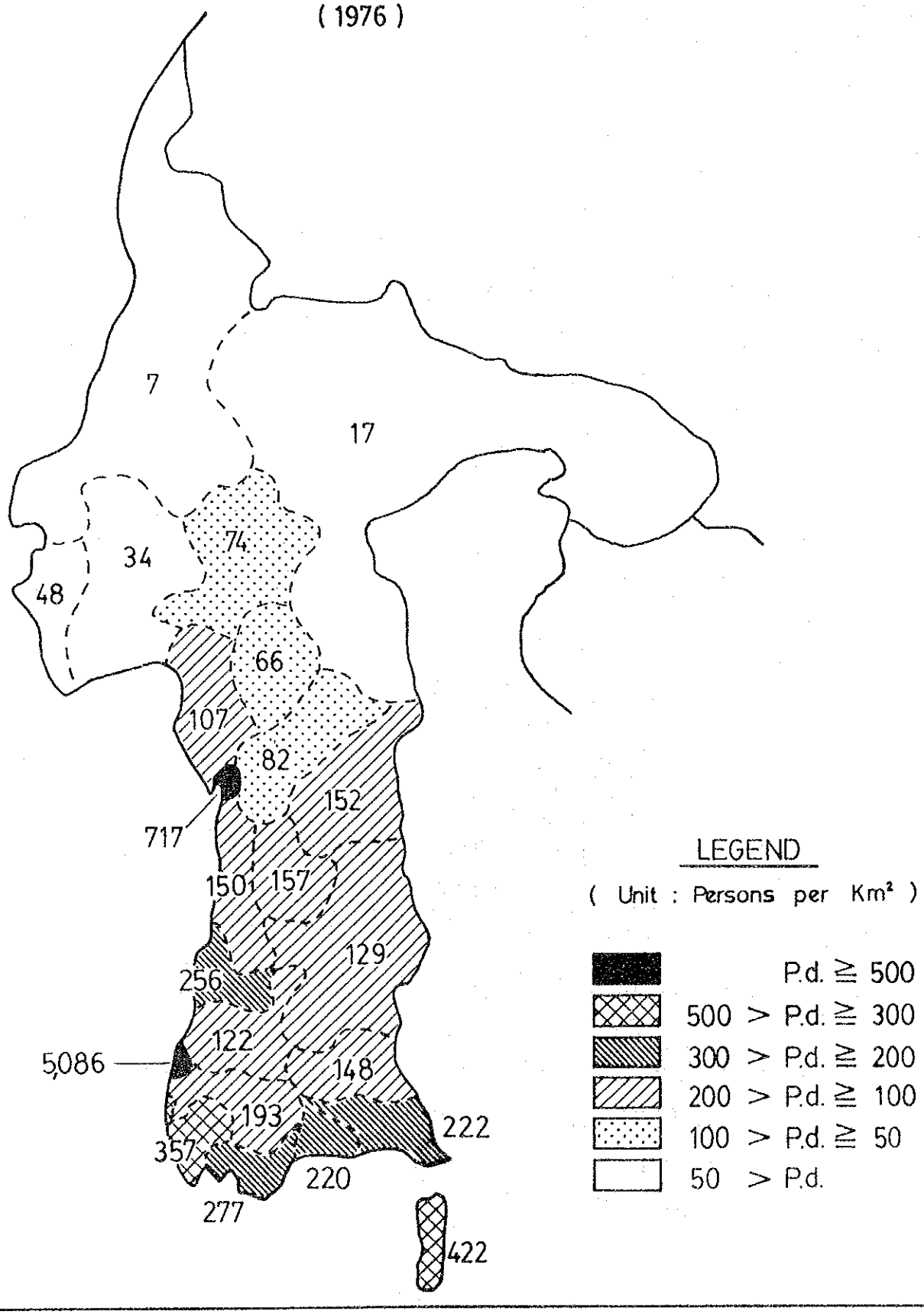


Fig. 2,3 Proposed Road by CIDA for REPELITA III and Long Term

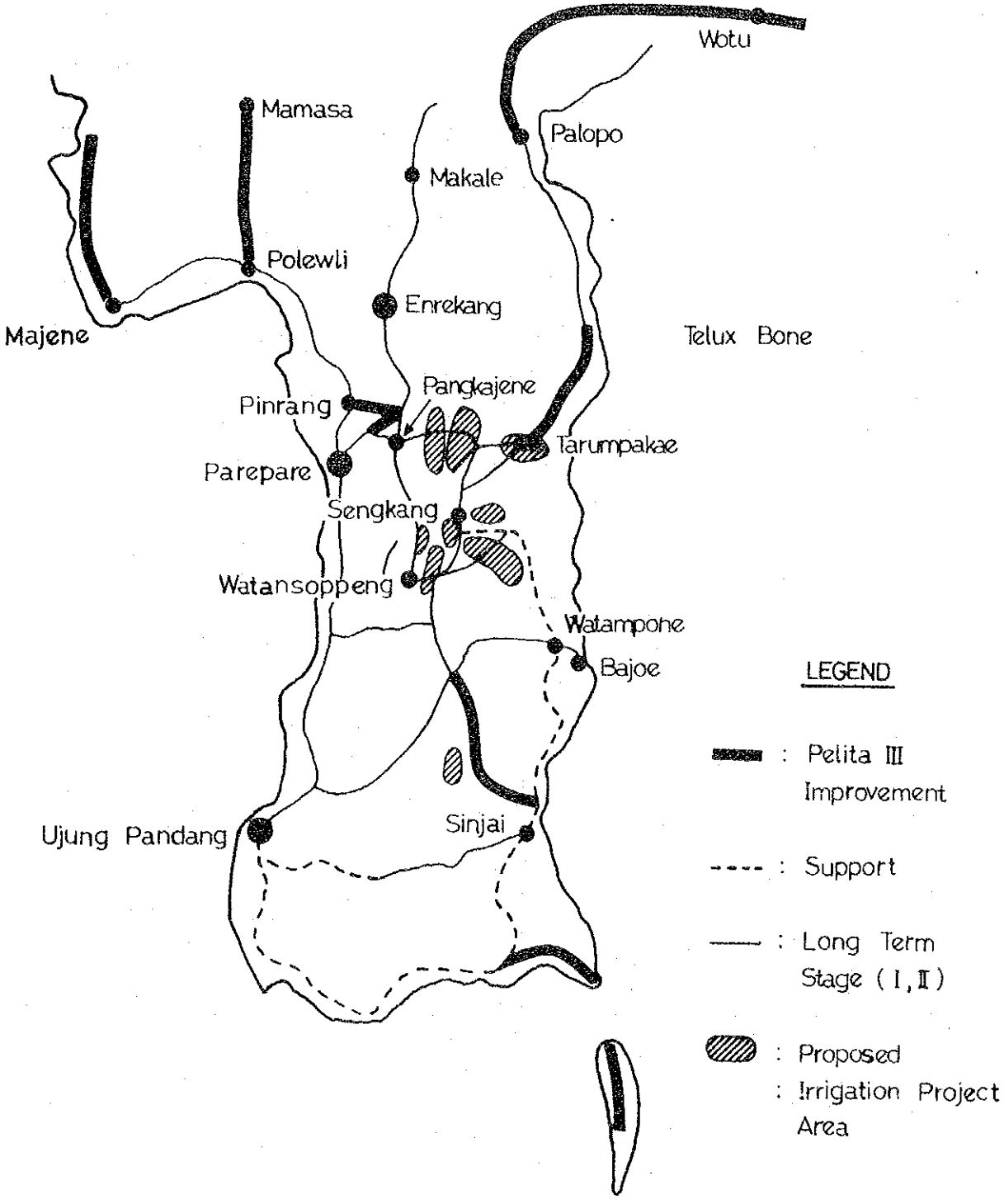


Fig. 3.1 Revenues

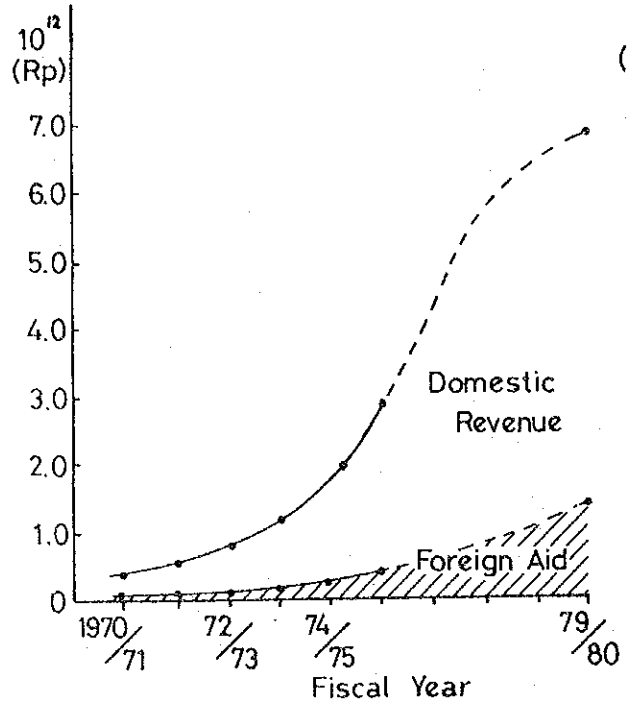


Fig. 3.2 Expenditures

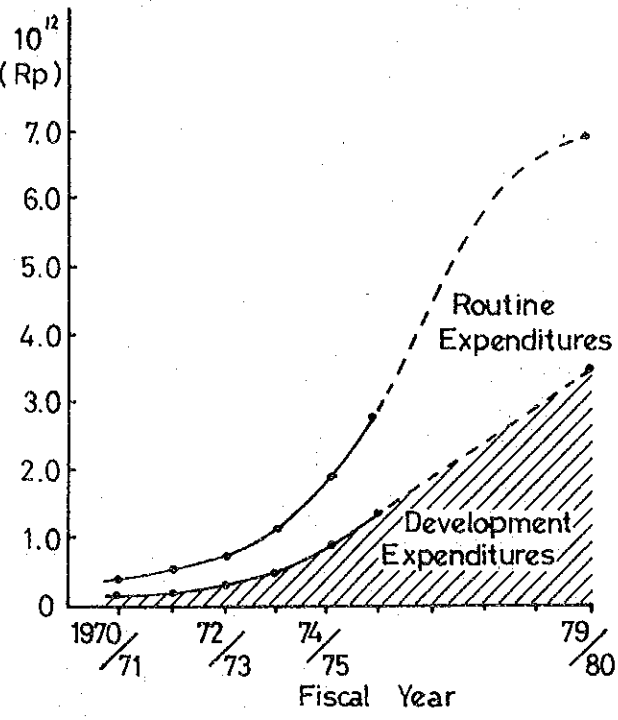


Fig. 3.3 Dependency Ratio to Foreign Aid in Development Expend.

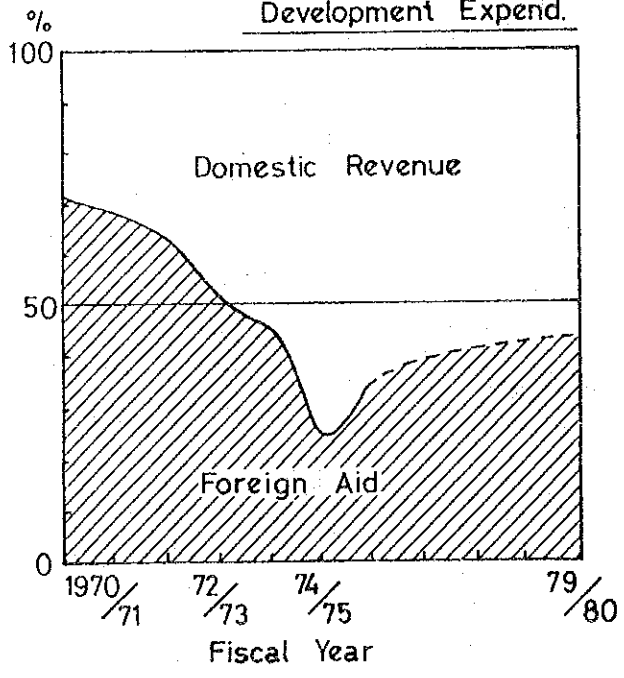


Fig. 5.1 Agricultural Production in 1977
(Food Stuff)

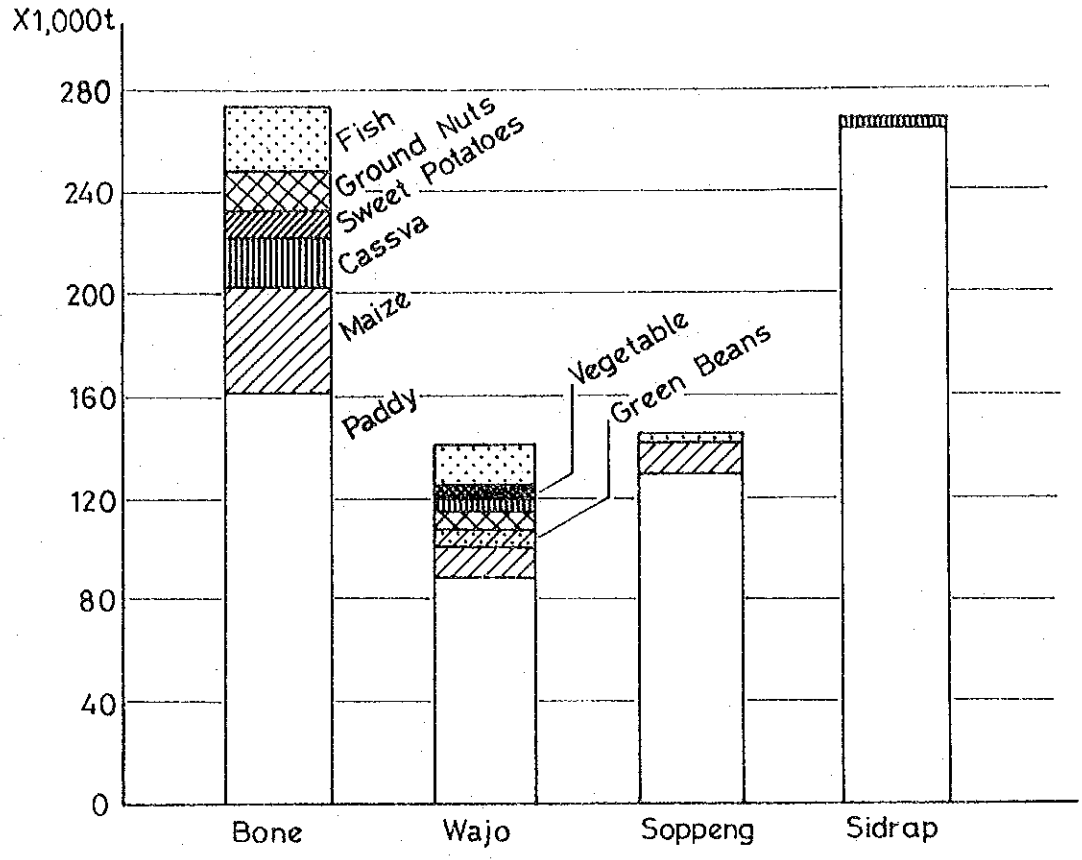


Fig. 5.2 Charge of the Productivity of Paddy

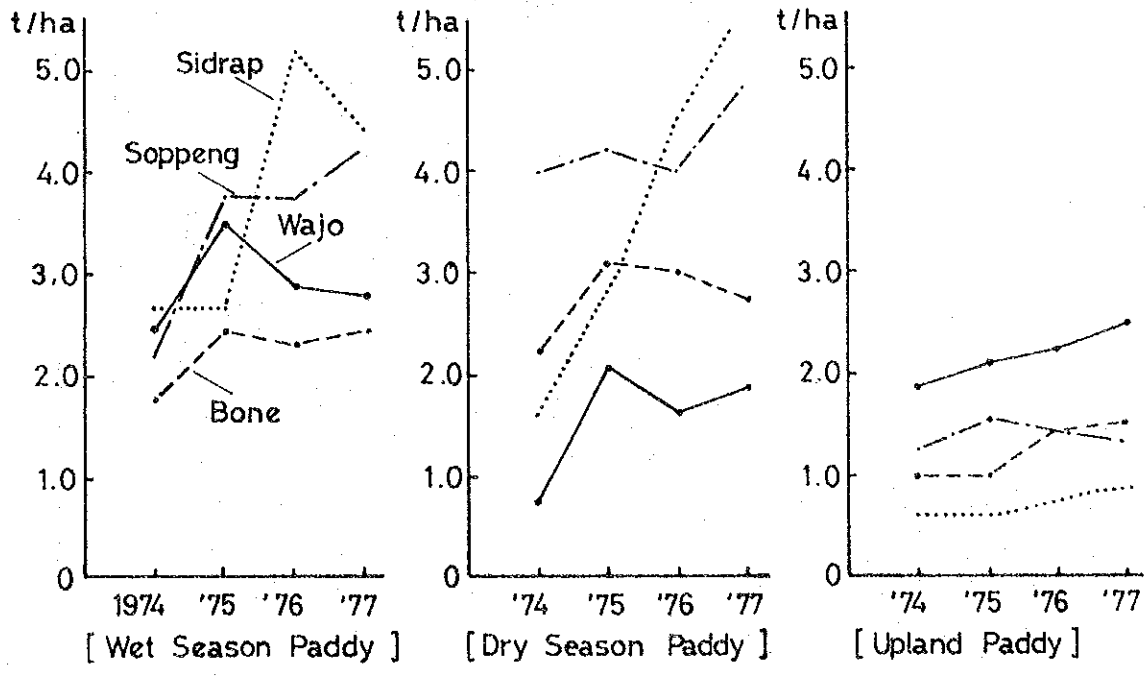


Fig. 5.3 Planted (PA), Harvested (HA) and Damaged Area (DA) in Wajo

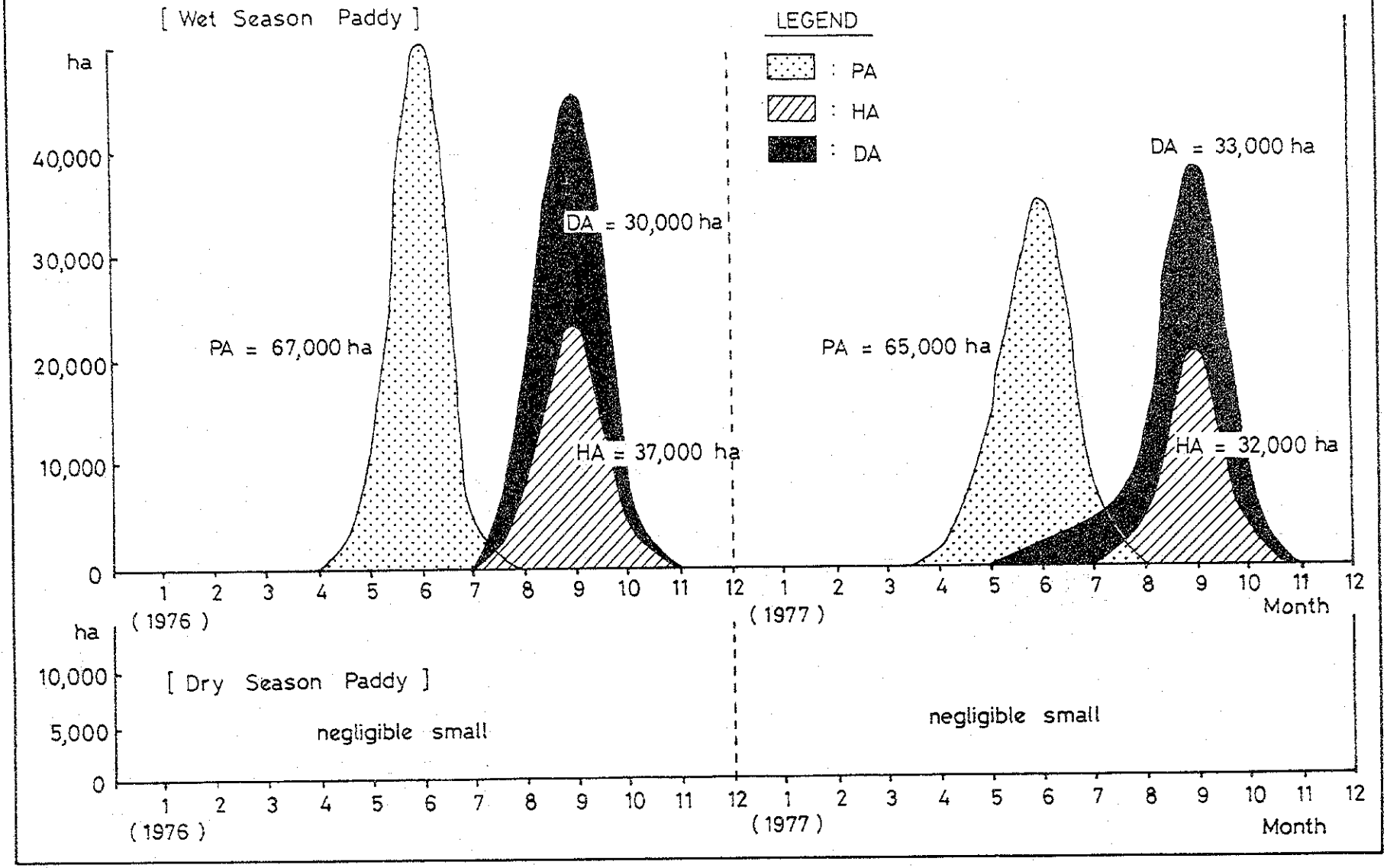


Fig. 5.4 Planted (PA), Harvested (HA) and Damaged Area (DA) in Bone

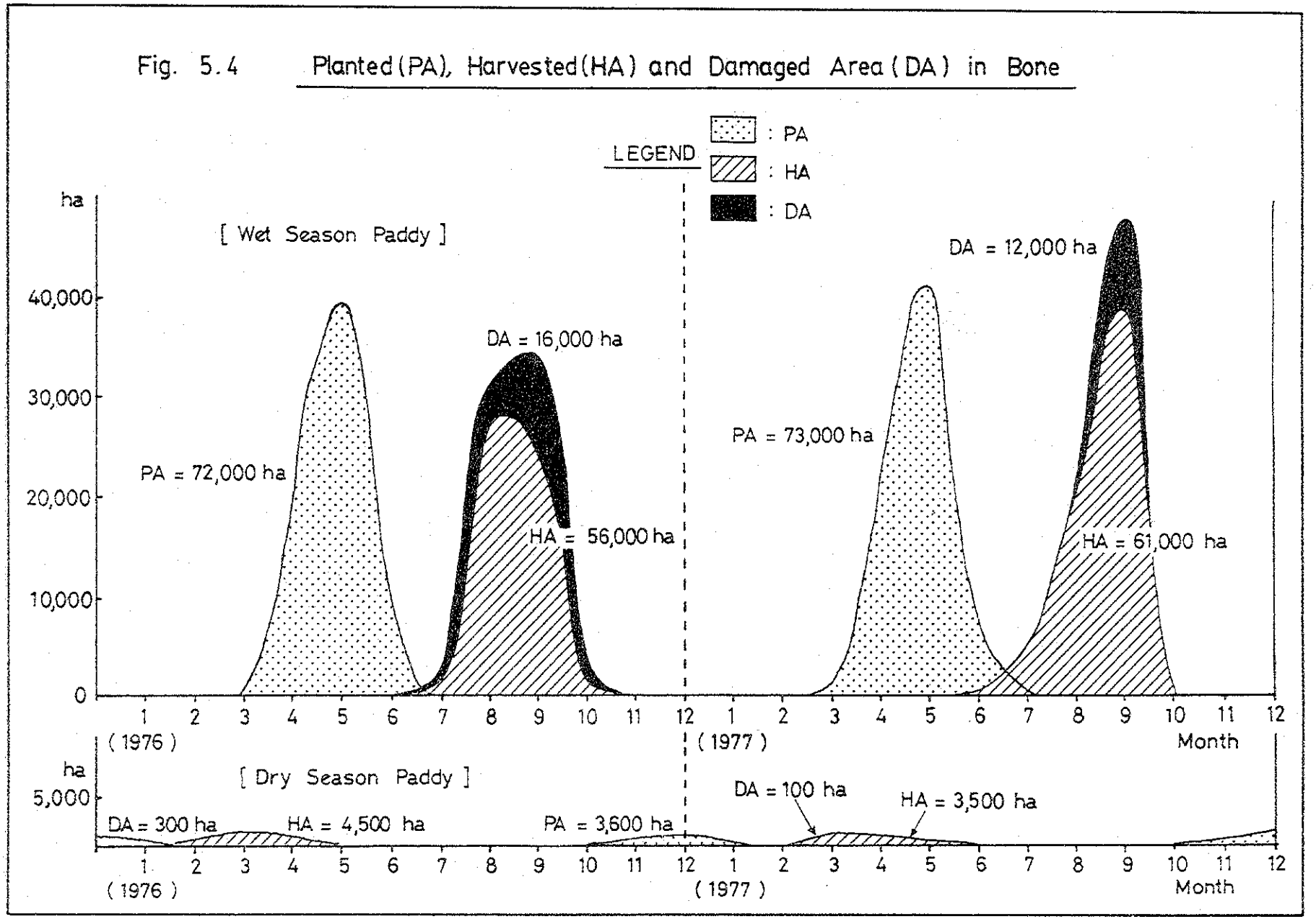


Fig. 5.5 Planted, Harvested and Damaged Area in Soppeng

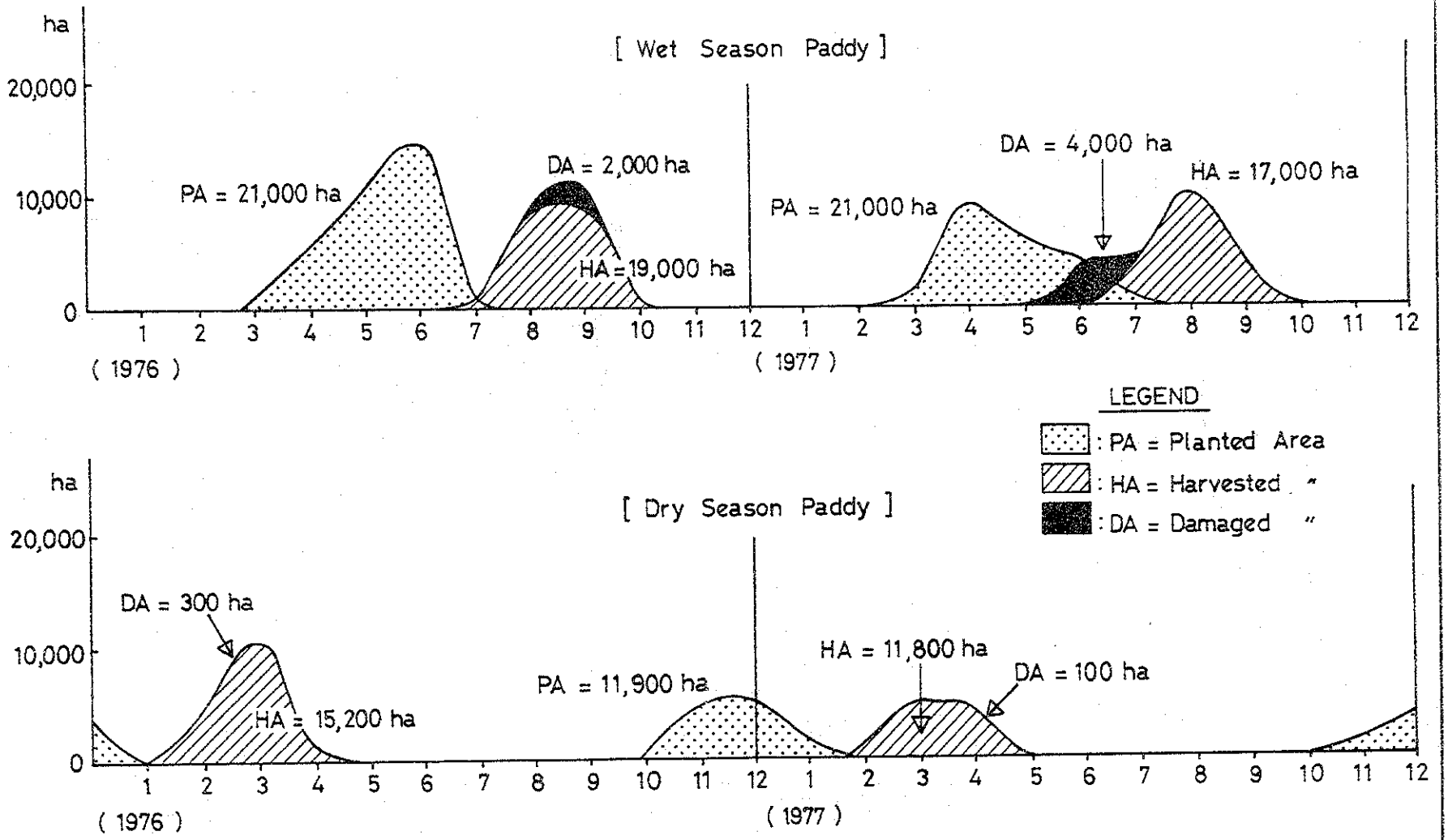


Fig. 5.6 Planted(PA), Harvested(HA) and Damaged Area(DA) in Sidrap

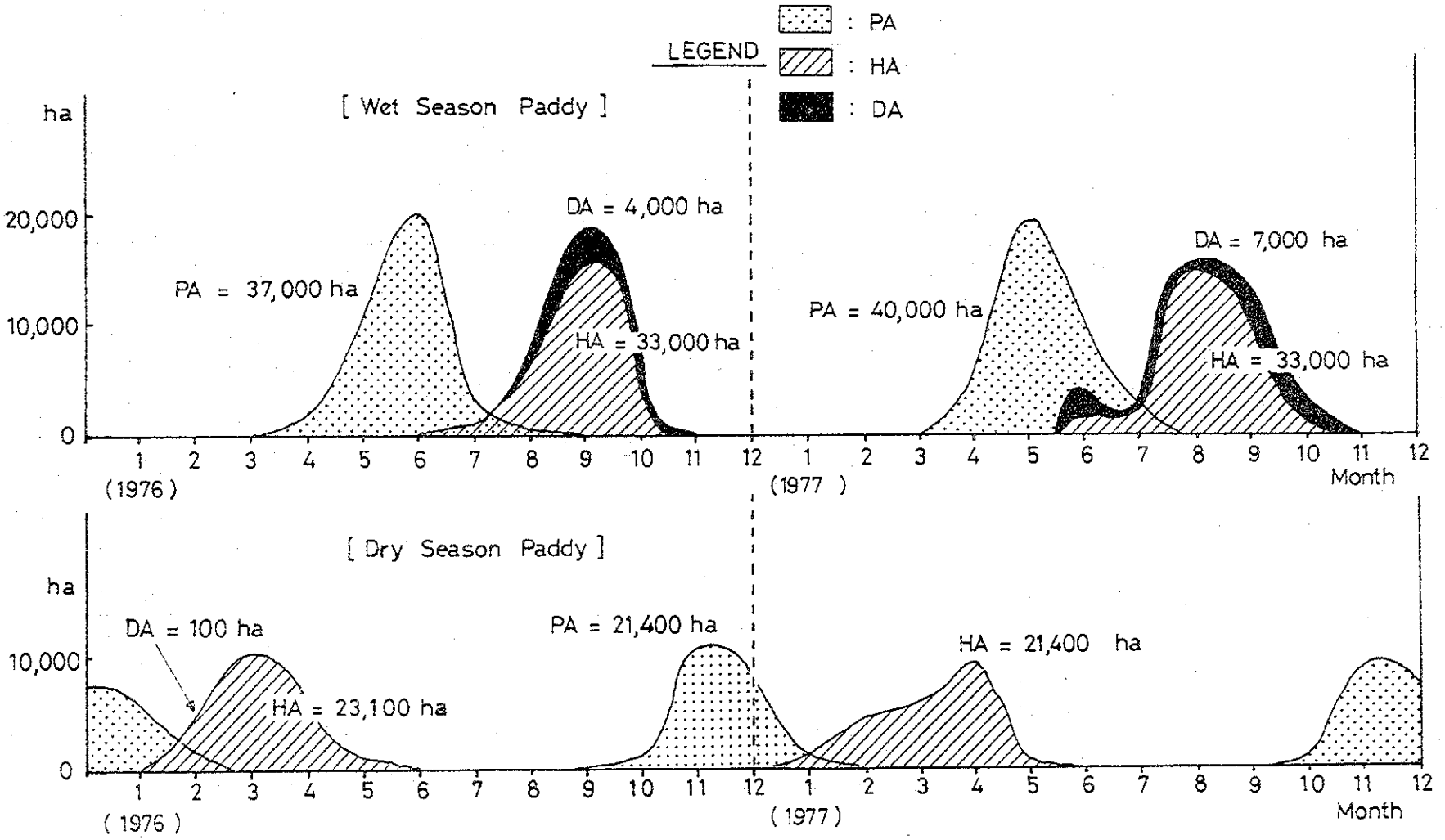


Fig. 5.7 Flow and Quantities of Rice Trented in Each Marketing Stage (1976)

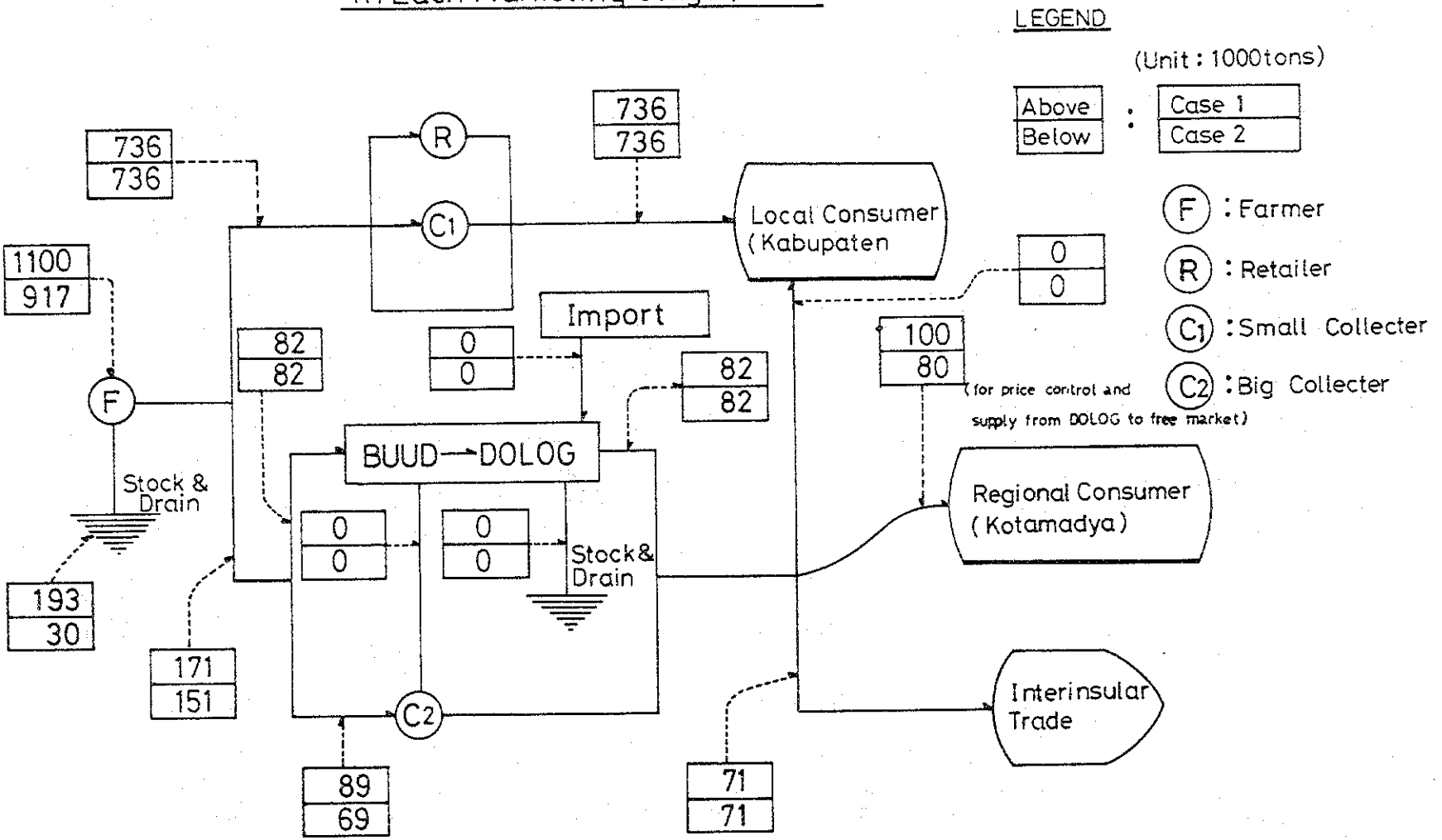


Fig. 8. 1. Location of the Proposed Plans