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**SOUTH SULAWESI
REGIONAL AGRICULTURAL DEVELOPMENT
PLANNING/ATA-140 PROJECT**

**FINAL REPORT ON PHASE II
VOLUME IV**

**AGRICULTURAL DEVELOPMENT
PLAN OF KABUPATEN ENREKANG
(AN EXAMPLE)**

ENGLISH EDITION

June, 1979

**THE TEAM OF THE PROJECT ON SOUTH SULAWESI RADP /ATA-140
IN UJUNG PANDANG**

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国際協力事業団

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P R E F A C E

In order to cope with the problems involving regional agriculture development, data have been collected which are further formulated into a report, under the guidance by the Japanese expert's Team.

This report gives an illustration on the present situation of agriculture and the various alternative and strategies which may be feasible in supporting agricultural development in the future.

The team of expert and counterparts have attempted to compile this report, with the hope that it would serve as manual in performing many activities dealing with regional agriculture development.

Nevertheless, it recognized that this report is far from perfection due to the limitedness of available time in completing it, and thus many shortcomings are still found here and there.

Therefore, ideas and comments are still requested from every party concerned. We do hope that the activities performed hitherto will be able to materialize the transfer of knowledge from the Japanese Experts to the Indonesian counterparts and will be of benefit in supporting the attainment of an equitable and prosperous community.

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S U M M A R Y

1. Natural condition

Topographically kabupaten Enrekang is a mountainous region, its shape being mostly undulated and hilly/mountainous. The hills and mountain ranges are relatively irregular in their distribution, and they are not aline, and consequently this region has irregular gradient and irregular shape of the slopes. Thus there are differences of altitudes between one place and the other.

Based on the regional shape and altitude (i.e. 47 m to 3,239 m. above the sea level), this region belongs to a mountain climate, which is characterized by a relatively high amount of rainfall and relatively low temperature (See page).

Result of analysis on monthly rainfall during 4 years (1974 through 1977) showed the following seasonal pattern: The dry season occurs around July and lasts till October and the wet season lasts from November through June (Refer to appendix 4). However, seasonal distinction is not too clear, rain distribution being uniform throughout the year.

Surveys conducted by the Bogor Institute of Soil Investigation in 1968 showed the occurrence of 3 soil types in kabupaten Enrekang, i.e. brown forest soil, mediterranean and podsollic. Mediterranean and podsollic soils are distributed throughout the region, at areas extending respectively 27,000 and 164,000 ha., whereas brown forest soil is only found in kecamatan Enrekang, at an extent of 3,100 ha. Thus it is apparent that podsollic soil prevails in this district.

2. Population

Population growth in this region shows an annual rate of 0.96% (1971-1978), which is lower than the rate of the South Sulawesi population growth, i.e. 1.6% a year.

Population density was 72 men/km² in 1978, and agrarian density was 0.27 ha/person. Agrarian density has already shown an alarming situation, where farmland ownership is very tight. Such a situation indicates the evidence of constraints on the inhabitants.

If the labour force development in 1975 remained constant, it would number 67,985 manpower in 1978, consisting of 33,553 male and 34,431 female labour force. Related to the available land, which was 33,866 ha. of farmland (excluding grasslands), one manpower cultivated 0.5 ha. of land. Thus labour force supply is sufficient and it enables intensive soil tilling and intensive crop cultivation, and enhancement of crop intensity.

3. Communication device

Communication device in this district is underdeveloped, both viewed from the number of road networks and from the quality of the existing roads and bridges. Therefore transportation system between villages and kecamatan towns is difficult; moreover, at times of heavy downpours, land sliding occasionally occurs, leading to a worse condition of the roads. In such a circumstance it is very hard to maintain a balance of supply and demand. When prices fluctuate, the farmer would generally have to take the risk. Additionally, the system of information and the distribution of production device are entroubled, thus leading to a fluctuation of agricultural production in this region.

4. Agricultural condition

Paddy field utilization for flood production (particularly paddy) has only reached 75% or 6,761 ha. in 1977 (wet season and dry season paddy), while the entire paddy field extended 9,000 ha., and the average annual utilization from 1973 through 1977 is 42% or 4,299 ha. The lack of paddy field utilized is due to the restricted extent of irrigated paddy fields, i.e. only 3,263 ha. or 36% by village irrigation. This implies that food production increase is still probable in this region. But information says that floods frequently occur in times of heavy rains, attacking food crop production areas, and thus limiting the utilization of farmlands.

Food production in this region fluctuates (1973-1977), and among the food crops, the ones increasing each year are: paddy, 19.5% cassava 5.9% and beans 10.1%, while those decreasing are: corn 13.6%, and sweet potato 2%. This fluctuating production was due, in turn, to fluctuations in the planted area and in the average yield per ha. (Refer to appendix 17, 18 and 19 or graphs 1 and 2).

Vegetable production development during 4 years (1973-1977) showed that cabbages had the largest amount of increase, i.e. 13.1%, followed successively by leek and onion, respectively by 5.2% and 5.1% a year and potato by 3.6% a year, while beans showed an annual decrease of 11% (See appendix 25 or graphs 5 and 6).

Estate crop production development trend during 5 years (1973 through 1977) showed that only coconut increased by 4.9% annually, while other commodities such as kapok, pepper, coffee and candlenut decreased respectively by 24.6%, 23.6%, 9.7% and 5.7% a year. Viewing the trend of areal expansion, however, quite the contrary has occurred: coconut decreased by 4.3% a year, and other commodities increased, namely: kapok 25.4%, candlenut 4.5%, coffee 2.2% and pepper 0.5% a year.

Those decreasing trends in commodity productions were mainly caused by the decline in average yield, namely: kapok 11%, pepper 11.5%, coffee 13.3% and candlenut 10.5% a year (See appendix 22, 23 and 24 or graphs 3 and 4).

5. Projections for 1983 and 1988

Estimation of population and labour force.

On the basis of the trend of population growth during 7 years (1971-1978), population of 1983 is estimated to number 139,343 and that of 1988 to be 145,667 people.

If labour force development remains the same in the future, it is estimated to be 73,239 in 1983 and 76,563 in 1988.

5.1. Estimation of food stuff requirement

Results of analysis on food stuff requirement in this region in 1977 showed the following shortages (Refer to appendix 21 for detail): Paddy - 1,139 tons, corn - 373 tons, potato - 663 tons, peanut - 250 tons, beans - 1,227 tons and meat - 968 tons. Excessive food stuff, on the other hand, are: cassava = 2,990 tons and vegetables = 3,179 tons.

Food requirement is estimated on the base of the population growth trend up to 1983 and 1988 and the average rate of production increase of the commodities concerned.

Calculations found that the food stuff production required to meet the needs in 1983 will be as follows:

Paddy = 32,156 tons (14.3%), corn = 3,205 tons (20.6%), potato = 3,623 tons (31.1%), peanut = 696 tons (70.4%), beans = 1,533 tons (59%) and meat = 588 tons (647.6%), while those for 1988 will be as follows: paddy = 33,615 tons (19.6%), corn = 3,350 tons (26%), potato = 3,787 tons (37%), peanut = 728 tons (77%), beans = 1,602 tons (621%) and meat 1,169 tons (1247.5%). Refer to appendix 28, 29 and 30.

5.2. Estimation of estate commodity development

Estimation of estate commodity production for 1983 and 1988 is based on rates of areal expansion and yields to be achieved.

The results of estimation of the production volume in 1983 are as follows: Coconut 363 tons (6%), coffee 645 tons (37%), candlenut 930 tons (73%), kapok 423 tons (655%), clove 303 tons (), and pepper 60 tons (122%). Refer to appendages and for detail)

Whereas for 1988 the estimations are: coconut 746 tons (117%), coffee 898 tons (161%), candlenut 1,739 tons (223%), kapok 2,050 tons (3560%), clove 1,107 tons (%) and pepper 61 tons (125%). Refer to appendages 31 and 32 for detail.

6. Problems, Strategies and Policy

6.1. Problems

The Master Plan can be summarized as follows:

The main socio-economic problems in this region are:

- a. Shortage of food stuff to meet people's requirement
- b. Underdeveloped communication device
- c. Forest denudation and occurrence of critical lands
- d. Lack of employment opportunity and people constraints in the agricultural sector
- e. "restrict commerce

6.2. Strategies

Results of analysis indicate the following strategies to be significant for agricultural development in this region:

- a. Improvements of the communication system and marketing system in order to equalize income distribution;

- b. Formulation of a food stuff demand and supply plan in order to indentify the people's consumptive needs;
- c. Conducting land reclamation, i.e. land utilization adjusted to its function capacity;
- d. Increase of employment opportunity, mainly in the processing, marketing and transportation of agricultural products;
- e. Increase of agricultural income to employ agricultural labour force in rural sites based on efforts of intensification.

6.3. Policy

Plan for target determination.

Based on the above-mentioned problems and strategies, the plan for the target of agricultural development in this region should cover the following items:

- a. Enhancement of food production for people's consumptive needs by improving irrigation, variety improvement, complete application of the Five Endeavours, and development of farmers' organizations by means of capable workers in an adequate number.
- b. Improvement and development of communication device, particularly economic roads in the rural sites in order to smoothen the transportation of agricultural products and the distribution of production device.
- c. Introduction and improvement of agro-processing methods in the context of quality improvement in agricultural products.
- d. Enhancement of reforestation and afforestation in critical lands, establishment of resettlement areas and safeguarding agricultural lands against hazards of flood and erosion.
- e. Substitution and development of tradable commodities with the progress in marketing and transportation, based on locational suitability on unutilized agricultural lands.

7. Priority program

7.1. Leading Project.

7.1.1. Communication device

One of the main obstruction in agricultural development in this region is the underdeveloped communication device; thus agricultural development indicates a fluctuating situation, and several commodities tend to decrease. This is particularly due to difficulties in information system and in the delivery of agricultural products and production device, which are major complements in enhancing production.

7.1.2. Forest and critical lands.

One of the factors causing the development of critical lands in this area is shifting cultivation in forest territory. This is, in turn, forced by the tight land ownership and the limited employment opportunity. It calls for a consideration on the provision of resettlement and the application of techniques of soil conservation in the hither to cultivated area.

7.2. Supportive Project

Food stuff and irrigation development.

Paddy field utilization in this region has only covered 73% of the 9,000 ha. of available paddy fields. Only 36% of the fields are irrigated.

Food crop production increase will be attained by development of irrigation device, improvement of the technique for crop cultivation, and intensive counselling.

7.3. Preventive and maintenance projects

7.3.1. Marketing

The difficulty of communication in this region constitutes a significant hindrance in the marketing of agricultural commodities and at the same time affects the run of the distribution of production device. A high production without an adequate channel of marketing would only lead to risks to be borne by the farmers involved in this activity.

Consequently, it ought to be considered as to the establishment of centres for collection and distribution, storage facilities and a suitable price guarantee.

7.3.2. Arrangement of a grazing system and grassland improvement.

Land utilization as grazing land calls for attention, considering the poor physical condition of the grassland. Therefore, consideration is needed concerning the localization of grazing land in order to avoid wild grazing.

I. Characteristics of Kabupaten Enrekang

1. Geography

Geographically, kabupaten Enrekang is a mountainous region, its shape being mostly undulated and hilly/mountainous. The hills and mountain ranges are relatively irregular in their distribution, and they are not all one, and consequently this region has irregular gradient and shape of the slopes. Such a geographic condition is one of the restrictive factors in agricultural development. Shallow spots are mostly located along the river course, which are generally cultivated for agricultural production.

2. Location and extent of the region

Kabupaten Enrekang is one of the 25 kabupaten-s in South Sulawesi province which is situated around the centre of the province, at a distance of about 230 km. from the provincial centre (Ujung Pandang) and approximately 80 Km to the north of the Pare-pare municipality.

3. Regional borders and administrative division

The borders of the kabupaten Enrekang are as follows:

- a. To the north : kabupaten Tator;
- b. To the east : kabupaten Luwu;
- c. To the south : kabupaten Sidrap, and
- d. To the west : kabupaten Pinrang

The region is divided into 5 administrative sub-districts, i.e.:

- a. Kecamatan Alla, consisting of 7 villages, extending 388 km²;
- b. Kecamatan Anggeraja, consisting of 5 villages, extending 243 km²;
- c. Kecamatan Baraka, consisting of 5 villages, extending 340 km²;
- d. Kecamatan Enrekang, consisting of 5 villages, extending 388 km²;
- e. Kecamatan Maiwa, consisting of 6 villages, extending 582 km².

4. Population

The trend of population growth during 7 years (1971-1978) shows an average rate of 0,96% annually (Refer to Appendix 1). As compared with the population growth rate of the South Sulawesi province which is 1.6%, this region has a relatively low population growth rate.

Whereas, comparing the number of population in 1967 with that of the entire South Sulawesi, the population of Erekang was only 2.18% of the entire number of South Sulawesi population.

From the view of population density, this region is relatively scarce as compared with that of South Sulawesi, Erekang has a population density of 67 men/km² while South Sulawesi has that of 94 men/km². (1976).

II. Natural Condition

1. Topography

Topographical condition of this region is generally undulated and hilly to mountainous; there are differences in altitude between one place and another.

1.1. Regional shape

This area may be said to be mostly undulated to hilly and mountainous. This implies that erosion is a matter deserving attention in maintaining natural well-being. Thus a system of soil and water conservation is essential in maintaining the balance in regional ecology.

Shallow spots are mostly located along the river course; three big rivers flow through this area (Saddang, Mata Allo and Kalumpang) to irrigate paddy field in kabupaten Pinrang and Sidrap.

1.2. Altitude

The altitude ranges from 47 m. to 3,239 m. above the sea level. *).

Altitudes of each kecamatan centre are respectively:

a. Belajen (Kec. Alla)	710 m.
b. Cakko (Kec. Anggeraja)	500 m.
c. Baraka (Kec. Baraka)	450 m.
d. Enrekang (Kec. Enrekang)	65 m.
e. Maroangin (Kec. Maiwa)	47 m.

2. Climate

Based on the regional shape and altitude, this region belongs to a mountain climate, which is characterized by a relatively high amount of rainfall and relatively low temperature.

2.1. Rainfall

Rainfall condition according to records by 3 stations are tabulated in Table 1. It will be seen from the table that the annual amount of rainfall ranges from 1,033 mm. to 2,197 mm.

According to results of analysis on rainfall data during 5 years (1973 through 1977) employing Schmid & Ferguson's method, this region belongs to the climatic type C. (Refer to appendix 2)

* Monography of kabupaten Enrekang; Agricultural Extension Service, 1975.

Table 1. Rainfall condition in kabupaten Enrekang during 5 years (1973 through 1977)

Year	Name of station.					
	Belajen		Baraka		Enrekang	
	Rainy day	Rainfall	Rainy day	Rainfall	Rainy day	Rainfall
	mm		mm		mm	
1973		1,706		320	91	2,894
1974		1,501		945		2,489
1975		1,706		1,698		2,116
1976	124	1,332	100	1,061	91	1,467
1977	104	1,335	125	940	108	2,018
Total:		7,380		5,164		10,984
Average:		1,476		1,033		2,197

Source: The Kabupaten Enrekang Agricultural Extension Service, Kabupaten Enrekang in figures, 1976 & 1977.

2.2. Temperature.

Temperature in this region varies between one place and another. This fact is due to the differences in altitudes. The temperatures in respective kecamatan centres are as follows:

- a. Belajen (kec. Alla) 21.97°C
- b. Calke (Kec. Anggeraja) 23.25°C
- c. Baraka (Kec. Baraka) 23.56°C.
- d. Enrekang (Kec. Enrekang) 25.90°C.
- e. Maroangin (Kec. Maiwa) 26.01°C.

(Refer to Appendix 3).

2.3. Seasonal pattern.

Seasonal pattern in this region is affected by that prevailing in South Sulawesi, this location being at the centre of Indonesia.

The dry season occurs around July and lasts till October and the wet season from November through June (Refer to appendix 4). However, the seasonal distinction is not too clear as rain still occurs during the dry season. Thus rain distribution in this region is practically good.

3. Soil condition

3.1. Soil types.

Results of surveys conducted by the South Sulawesi Survey Team of the Bogor Institute of Soil Investigation in 1968 showed that the prevailing soil types found in this region are podsollic and mediterranean. (Refer to Appendix 5).

3.2. Soil physical property.

According to Dr. Ir. Kang Biauw Tjwan, podsollic and mediterranean soils have medium to low permeability and medium to high erodible degree.*) These properties require various techniques of erosion control to avoid top soil erosion.

4. Vegetation

Vegetation in forests of this region has had devastation or denudation. This is attributable to many factors, e.g.

- a. the topographic condition facilitates erosion as most of the area, are steep slopes;
- b. rainfall is relatively high, thus maintaining the hazard of erosion;
- c. the soilphysical property makes it sensitive against erosion;
- d. lack of community's understanding to the function/role of vegetation at steep sloping places.

These are all the cause of erosion, but the main cause is actually the human factor, i.e. the lack of consideration for the regional condition; thus the devastated critical area reaches an extent of 58,762 ha. which is 62% of the entire forest territory. Therefore it calls for a consideration of a vegetation management system in order to prevent erosion.

III. Socio-economic condition

1. Labour force

The labour force development in 1975 remaining the same, in 1978 it numbered 67,985 manpower, consisting of 33,553 male and 34,431 female labour force (Refer to Appendix 6).

Viewing the comparison between the number of male and female labour force, female labour force numbers more than the male, i.e. 50.56% of female and 49.35 of the male. Relation of labour force to the total population in 1978 (129,348 people) was 56.56%, consisting of 25.94% male and 26.62% female.

2. Employment field

Based on estimation of employment field in 1974 (see appendix 7), employment fields in 1978 were as follows:

Agricultural sector	25,756 manpower	80%
Commerce	644	2%
Industry	1,932	6%
Civil service	2,575	8%
Other sectors	1,280	4%

Above mentioned data shows that the agricultural sector gives the largest employment field, followed in succession by civil service and industry, and the least is commerce.

3. Communication device

3.1. Roads/land traffic condition

One of the main problems in agricultural development in this region is the shortage of roads, particularly those passable by cars. Data found at the Public Works Service, either those compiled by the Regional Public Works Service or by the Section of road establishment, show an illustration of the roads such as shown on Table 2 and 3.

Table 2. Condition and types of roads in kabupaten Enrekang

Road type	Road length (km)		Development	
	1976	1977	length	%
Earth	43.5	39.5	-4	- 9.2
Pebbled	11.5	15.5	+4	34.8
Asphalt paved	21.5	24.5	+3	14.0
Total	76.5	79.5		

Source: Kabupaten Enrekang in figures, 1976-1977.

Table 2 shows an increase of 3 km long in paved roads and 4 m. in pebbled roads.

Percentages of each road length from the length of regional roads are as follows: Earth road 49.7%, pebbled roads 9.5% and paved roads 30.8%.

Conditions of public roads, i.e. the Rappang-Enrekang-Makale highway, are shown on Table 3.

Table 3. Condition of the Rappang-Enrekang-Makale public highway, 1977

Condition	Type of construction		Class	Total	%
	paved	pebbled			
Good	43.6 km	5 km	III A	48.6	57.45
F a i r	27 "	4 "	III A	31	36.64
Damaged	3 "	2 "	III A	5	5.91
Total:	73.7 Km	11 Km	III A	84.6	100.00

Source: Kabupaten Enrekang in figures, 1977.

It is shown on the Table above that the public roads are generally in a relatively good condition.

The locations of the road types are as follow:

- Paved roads : - Rappang-Enrekang-Makale highway, except for 11 km uptown of Enrekang is pebbled.

- Between Cakke and Baraka
- Around the town Enrekang and Maroangin.
- Pebbled roads:- Between Maroangin and Bolli village (Kec. Maiwa)
- Between Baraka and Pasui village (Kec. Baraka)
- Between Baraka and Salukanan village (Kec. Baraka)
- Between Baraka and Malua village (Kec. Baraka)
- Between the highway and Baroko village (Kec. Alla)

The road networks mentioned above are passable by cars, while only part of the earth roads are passable by cars during the wet season

3.2. Bridges and Duiker

Condition of bridges and duiker in this region is shown on Table 4 and 5. Those tables show that 50.63% of the bridges and duiker are of temporary construction and 49.37% are permanent.

Bridges and duiker have a total number of 158.

Public bridges managed by the Road Establishment Section of the Public Works Service are shown on Table 5.

Table 4. Condition of bridges and duiker in kabupaten Enrekang in 1977.

Type of construction	Bridges	Duiker	Total	Percentage
Temporary	11	69	80	50.63
Permanent (concrete & iron)	25	53	78	49.37
T o t a l	36	122	158	100.00

Table 5. Condition of public bridges by construction type in Kabupaten Enrekang in 1977.

Highway	Type of construction	Length (m)	Number	Condition		
				Good	Fair	Damaged
Rappang-	Concrete bar	34.05	6	5	-	1
Enrekang-	Iron bar	189.25	17	7	6	4
		158.20	4	3	-	1
Makale		21.30	1	-	1	-
	Hanging bridge	66	1	-	-	1
		43.60	2	-	-	2
		46.30	8	1	6	1
T o t a l :		559.20	39	16	13	10
Percentage			100	41	33	26

Table 5 shows the condition of public bridges as follows: 41% in good condition, 33% fair, and 25% damaged. Total number of public bridges is 39.

4. Agricultural Extension Officers and Organization

Condition of the agricultural extension organization and officers is to be seen in Appendix 8 and Table 6.

Among 10 existing cooperatives; 4 are inactive and non-operating, i.e. the Kaloci coffee farmers' cooperatives, Masedi Atie Animal Husbandry Cooperative, Maiwa Smallholders' Animal Husbandry and Mata Allo Sericulture Cooperative. The inactivity of those cooperatives, according to records, was due to shortage of capital.*) Whereas BUUD/KUD concentrate their activities in paddy production increase and have not included other commodities.

Table 6 will show further condition of farmers' organizations, the Four Device and the available extension officers.

Table 6. Condition of farmers' organizations, Four Device and Extension Officers in Kabupaten Enrekang in 1977.

Kecamatan	BUUD/KUD		BRI number	Device member	farmers' group		Ext. Officers	
	Number	Member			number	member	Field	Key
Enrekang	1	232	1	2	50	4,844	4	29
A l l a	1	166	1	5	21	624	4	24
Baraka	1	40	1	3	36	792	3	31
Anggeraja	1	154	1	4	18	440	2	-
Maiwa	1	112	1	1	10	227	2	35
T o t a l	5	704	5	15	135	6,927	15	119

Source: Kecamatan Office of Kabupaten Enrekang.

Table 6 has shown that there are 135 farmer groups in this region, with 6,927 members, and 134 extension officers comprising 15 field extension officers (PPL) and 119 key farmers.

IV. Analysis of the present conditions

1. Population

1.1. Growth trend

One of the social phenomena in this area is the fluctuation of population growth (See App.1). This indicates the occurrence of population outflow/movement.

Population data of South Sulawesi shows 4 districts of which the population flows out, i.e. Wajo, Bone, Enrekang and Jeneponto. Consequently the population growth rate in these districts is relatively low, i.e. 0,96% annually (See App.1). Sex ratio in the adult age group (15 years and over) shows a bigger number of female, i.e. 35,248 female and 30,305 male in 1978. This indicates quite a high probability of childbirth in this region.

1.2. D e n s i t y

Population density in 1978 was 72 men/km², and agrarian density was 0,27 ha/person (See app.9). Population is rather scarce, but agrarian density has already shown an alarming situation, where farmland ownership is very tight. Such a situation indicates the evidence of constraint in the agricultural sector. This will have a future effect of decreasing farmland availability, continuously decreasing food stuff production per capita and increasing unemployment.

1.3. Labour force and employment field.

Labour force in 1978 was estimated to number 67,985 manpower. (See App. 10). Related to the available land, which was 33,866 ha. of farmland (excluding grassland), one manpower cultivated 0.5 ha. of lands. Thus labour force supply is sufficient and it enables intensive soil tilling and intensive crop cultivation, and enhancement of crop intensity. In the relation between the number of labour force and the available employment field, there is an excess of labour force, i.e. 35,790 or 52.6%, and the economically active labour force numbers 32,195 manpower or 47.4% of the total number of labour force (Refer to App.10 and 11). This excessive labour force will be a burden and thus it calls for the enhancement of labour force absorption in the agricultural sector.

2. Irrigation and water streams

This district is a river watershed area (DAS) where 9 large rivers flow (Refer to App. 12). A problem occurs in water supply in this region, implying that in the wet season erosion and floods occur frequently while in the dry season water supply is limited. This is mainly due to the extensive denudation of forest.

Irrigation works have not existed here, whether it is technical or semitechnical irrigation, so the extent of irrigated paddy fields is only 36% of the total extent of paddy fields (9000 ha.) or 3,268 ha. (by village irrigation).

In order to overcome this limited water supply, the local community made restorations of the village irrigation, thus 28 village irrigations are recorded in this district (Monography of Kab. Enrekang).

3. Communication device

Communication device in this district is underdeveloped, both viewed from the number of road networks and from the quality of the existing roads and bridges as compared with the regional potency and the number of villages (Refer to Tables 2 and 4 and Appendages 13 and 14).

Moreover, this region being mostly hilly and mountainous, alternated with steep slopes, it relatively hinders transportation, and worse still, in the wet season when heavy downpours result in land sliding, communication worsens. In such a circumstance, transportation of agricultural products and distribution of production means are nearly paralyzed. At the same time, the scattered location of production areas at relatively narrow sites yields quite a trouble in product collection. Therefore the existing communication device at present should be restored immediately, considering the decline which has nearly reached 50% (Refer to Table 2 and 4).

4. Soil potency

4.1. Soil types

The survey conducted by the Bogor Institute of Soil Investigation in 1968 showed the occurrence of 3 soil types in kabupaten Enrekang, i.e. Bown forest soil, mediterranean and podsollic. Mediterranean and podsollic soils are distributed throughout the region, at areas extending respect-

ively 27,000 and 164,000 ha. or about 15.9% and 84.49% of the total area, whereas brown forest soil is only found in Kecamatan Enrekang, at an area extending 3,100 ha. or 0.16% of the entire area (Refer to App.15). Thus it is apparent that podsollic soil prevails in this region.

4.2. Physical and chemical soil properties.

Podsollic soil: it is found in undulated to hilly areas at altitudes ranging from 47 to about 2000 m. above the sea level. The main substances are acid volcanic tuff, quartz sandstone, quartz sediment and claystone. The texture is sandy loam and clay loam. Water resistant power is poor, permeability ranges from moderate to slow, and erodible degree is high. Soil reaction ranges from very acid to acid at pH of 3.5 to 5.5. Organic content of the topsoil is generally low (below 10%). Inorganic content (N, P and K) is unusually low. Soil fertility ranges from low to medium.

Mediterranean soil; this type has an undulated regional shape, and when the main substance originates from limestone, the region is hilly to mountainous in shape. Altitude ranges from 47 to 600 m. above the sea level. The texture is between loam and heavy clay. Soil reaction is slightly acidic to neutral (pH 6.0 to 7.5). Water resistance is moderate, and erodible degree is moderate to high. Organic content of topsoil is usually low (less than 3%). Inorganic content is relatively high in general. Fertility is medium to high.

Brown forest soil: This soil type generally has a regional shape of undulation to hills. Main substance originates from coral stone or limestone. Altitude is indefinite. Texture is clayish to loamy, pH is 6.0 to 8.0. Organic content is low (3%). Basic saturation is high. Absorptive power is moderate, permeability is moderate, inorganic content is low. Erodeable degree is high.

5. Land-use

Land-use consists of 17.23% farmlands, 27.64% grasslands, 37.73% forest territory, 0.05% fishery, and 17.35% other uses. Appendix 16 shows the land-use condition.

5.1. Farmland

It occupies an area of 33,866 ha. or 17.44% of the entire kabupaten, and it is divided into 9,000 ha. of wetland paddy fields and 24,866 ha. of upland fields. Farmland expansion is difficult due to impossible topographic condition. Farmland reclamation under a disadvantageous condition at the absence of soil conservation technique will turn the soil erodible and will result in critical lands which are difficult to restore to their original condition. Production increase can only be achieved through intensification and soil improvement.

5.2. Grassland.

This occupies an area of 53,657 ha.*) or 27.5% of the entire area. Part of the grassland does not meet the qualification for a grazing pasture, as livestock graze on grassland with quite a high gradient. This may result in soil devastation and increase of critical area in this region.

5.3. Forest territory

It occupies an area of 73,250 ha. or 37.7% of the entire kabupaten. This forest territory comprises the following forest compounds:

- Latimojong	28,780 ha.
- Buntu Rajanna	2,120 ha.
- Bamba Puang	13,680 ha
- Paduktu	350 ha
- Datunila	10,100 ha
- Batu setan	15,000 ha. and
- Ambessu	3,220 ha.

Wild grazing in forest areas and reclamation of upland fields generates a hazard to the well-being of forests in this region. It is estimated that 27,930 ha. or 38% of the forest territory has had denudation, and reforestation has been conducted on an area of 15,880 ha. or 21.7% of the existing forest territory.

* Data from the Sub-directorate of Economics, the Kabupaten Administration Office of Enrekang.

5.4. Fishery

This has no significant potency as the condition of the region does not permit fishery enterprising. Only inland fishery is undertaken, at an area of 100.5 ha. or 0.05% of the Kab.

6. Condition of the area and agricultural production

6.1. Food crops.

From the view point of natural condition, this area is limited to areal development for food crops.

Food crop production development fluctuated from 1973 through 1977; among the food crops increasing each year were: paddy, 19.5%, cassava, 5.9%, and beans, 20.2%, while those decreasing were: corn, 13.6% and sweet potato, 2%. (Refer to Appendix 17 and graph 1).

The decrease in corn production was due to the annual decrease in the planted area and the average yield, respectively by 9.5% and 3.7% and the decline in sweet potato production was due to the decline in its average yield by 4% a year (Refer to Appendages 18 and 19 and graph 2).

Consequently it is practically said that the fluctuating production was, in turn, due to fluctuation in the planted area and in the average yield (Appendages 18 and 19). On the other hand, from the viewpoint of the planted area, especially that of paddy each year, utilization of the available area (i.e. 9,000 ha. of paddy fields) has only reached 48% or 4,299 ha. (App. 18).

The lack of usable paddy fields was due to the lack of irrigated paddy fields (36%) and the less functioning of irrigated paddy fields (See app. 20). From the viewpoint of paddy field area utilization, it is implied that it is still probable to increase food stuff production, particularly paddy, in this region. However, information says that in the wet season where heavy downpours occur, floods frequently occur in this region and endanger food crop cultivation areas. This is the cause for the restrictiveness in the utilisation of paddy fields and probably other lands as well.

Meanwhile, the average yield attained each year is relatively low, i.e. paddy 3.94 tons/ha., corn 0.7 tons/ha., cassava 8.64 tons/ha., sweet potato 4.66 tons/ha., and beans 0.68 tons/ha. (See Appendix 19).

The low average yield was attributable to the unequally distributed top varieties among the farmers, and by the unsuitability of the varieties grown to the local physical condition. The low utilization of the soil and the low yield attained make this area short of food (See app. 21).

Based on the above-mentioned description, the policy for food production development in this region has only included the following items: improvement of irrigation system, prevention of floods/erosion and improvement of drainages, variety improvement (biological technology) and applications of fertilizers/pesticides (chemical technology), fostering of farmers' organizations through qualified extension officers, and improvement of communication device in order to smoothen the run of production device distribution and that of information system.

6.2. Estate crops

Estate commodities in this region are mainly cultivated by smallholders, in which the methods of enterprising are still extensive of character, namely using production input. In this connection, production development trend and areal expansion are seen to be fluctuating from year to year, particularly production shows a decreasing trend (See app. 22 and 23 and graphs 3 and 4).

Production development trend during 5 years (1973 through 1977) showed that only coconut increased by 4.9% annually, while other commodities such as kapok, pepper, coffee and candlenut decreased respectively by 24.6%, 23.6%, 9.7% and 5.7% a year. Viewing the trend of areal expansion, however, quite the contrary has occurred: coconut decreased by 4.3% a year, and other commodities increased, namely: kapok 25.4%, candlenut 4.5%, coffee 2.2% and pepper 0.5% a year.

Those decreasing trends in commodity productions were mainly caused by the decline in average yield, namely: kapok 11%, pepper 11.5%, coffee 13.7% and candlenut 10.5% a year (See app. 24).

Related to climatic/rainfall condition in the same year, the negative effect on production is relatively small, because rainfall distribution is quite uniform (See app.4). In such case, the system of cultivation may be poor, thus generating weeds, pests and diseases which tend to reduce yields.

The above-mentioned description indicates that the farmers have not based their cultivation on intensive management methods. Thus, a policy for estate commodity development in this region should cover the following items.

- Plant renewals, particularly for coffee and coconut, applying good varieties. For coffee, particularly, better shelter trees should be employed.
- Improvement in distributing varieties to farmers by means of farmer group
- Improvement of extension system through an adequate number of capable officers.
- Improvement of the method of agro-processing in order to obtain a better quality
- Improvement of communication device to smoothen the transportation of products and the distribution of production device and information system

6.3. Vegetables

Viewing the natural condition, this region is a vegetable producing area where the topographical condition permits it, being mostly hilly and mountainous, at altitudes ranging between 47 m. and 3,250 m. (1,639 m. in average).

Analysis of the production development trend during 4 years (1974 through 1977) showed that cabbages have the biggest increase, i.e. by 13.1% a year, followed in succession by leek and onion, respectively by 5.2 and 5.1% a year, and potato by 3.6%/year.

Beans, on the other hand, show a decrease by 11% a year (App. 25 and graphs 5 and 6).

The majority of those commodities traded are: cabbages and potatoes, i.e. to Ujung Pandang, Kalimantan (through Pare-Pare), Malili (INCO) and Kendari (through Bone).

Availability of those markets leads to a good prospect, but what calls for attention is that the producers/farmers are not united within any organization, so that the price level of those commodities is decided unilaterally by the middlemen. Therefore it may need consideration to organize the vegetable farmers, e.g. within cooperatives, so they will procure a monopsonic position against the middlemen.

Besides, variety improvement and the application of fertilizers and drugs will be more disseminated among farmers by the existence of cooperatives referred to above. Moreover, vegetables are generally perishable commodities, therefore several measures are required for the development of this commodity, i.e. facilities for storage and collection, transit centres, and improvement of communication device.

Distribution of those vegetables are as follows: the largest amount cultivated are in Kecamatan-s of Alla, Barata and Anggeraja, and the slightest in kecamatan Berekang, at planting areas extending respectively 1,011 ha., 595 ha., 242 ha. and 106 ha. and average production of respectively 5,518 tons and 285 tons a year. (See appendix 26).

The regional conditions of the three kecamatan-s above enable vegetable cultivation, because the topographical conditions are generally hilly and mountainous, at an altitude of 600 m. or more.

To warrant vegetable development, a seed garden will be required, which should preferably be located in Marena (under kecamatan Anggeraja), a spot strategically located and having a good communication means.

7. Projections for 1983 and 1988

7.1. Estimation of population and labour force.

On the basis of the trend of population growth during 7 years (1971-1978), population of 1983 is estimated to number 139,343 and that of 1988 to be 145,667 people.

If labour force development remains the same in the future, it is estimated to be 73,239 in 1983 and 76,563 in 1988.

7.2. Estimation of food stuff requirement.

Results of analysis on food stuff requirement in this region in 1977 showed the following shortages (Refer to appendix for detail): Paddy - 1,139 tons, corn - 373 tons, potato - 665 tons, peanut - 250 tons, beans - 1,227 tons and meat - 968 tons. Excessive food stuff, on the other hand, are: cassava = 2,990 tons and vegetables = 3,179 tons.

Food requirement is estimated on the base of the population growth trend and the average rate of production increase of the commodities concerned.

Calculations found that the food stuff production required to meet the needs in 1983 will be as follows:

Paddy = 32,156 tons (14.3%), corn = 3,205 tons (20.6%), potato = 3,623 tons (31.1%), peanut = 697 tons (70.4%), beans = 1,533 tons (590%) and meat = 500 tons (647.6%), while those for 1988 will be as follows: paddy = 33,615 tons (19.6%), corn = 3,350 tons (26%), potato = 3,787 tons (37%), peanut = 728 tons (77%), beans = 1,602 tons (621%) and meat = 1,169 tons (1247.5%).

7.3. Estimation of estate commodity development

Estimation of estate commodity production for 1983 and 1988 is based on rates of areal expansion and yields to be achieved. The results of estimation of the production volume in 1983 are as follows: Coconut 363 tons (6%), coffee 645 tons (87%), candlenut 930 tons (73%), kapok 423 tons (655%), clove 303 tons (), and pepper 60 tons (122%).

Whereas for 1988 the estimations are: coconut 746 tons (117%), coffee 898 tons (161%), candlenut 1,739 tons (223%), kapok 2,050 tons (3560%), clove 1,107 tons () and pepper 61 tons (125%). (Refer to appendages 31 & 32 for detail).

V. PROBLEMS AND SUMMARY

1. Leading Project

1.1. Communication device.

The condition of communication device in this region constitutes a major obstruction against the enhancement and the continuity of agricultural production, because transportation of agricultural products from production areas to markets (in Desa or Kecamatan) needs various kinds of device, ranging from horseback to motorized vehicles. (See appendix 33).

Such a series of transportation will reduce the quality of the commodities which in turn will reduce their prices; it is particularly true of vegetables. Moreover, transportation of production device (fertilizers, drugs, seed etc.) which constitute major elements in facilitating production continuity is disturbed, and this circumstance minimizes the availability of production device to be applied by the farmers.

Consequently the policy on agricultural development in this region has to emphasize enhancement of communication device, thus smoothening the run of information system and the transportation of agricultural products as well as the distribution of production device. A program for the enhancement of communication device has been formulated and it is shown in Appendix 34.

1.2. Forests and critical lands.

The limited farmland and the lack of employment field affect the socio-economic condition of the inhabitants. Agrarian density reaches 0.27 ha/man. This tight land-ownership compels them to reclaim new farmlands by setting forests on fire, regardless of the principles of soil conservation.

This condition leads to a disturbance in forest stability, thus entroubles forest's function as water regulator. To avoid further worsening of this condition, a conseration is called for concerning the provision of resettlement sites so the inhabitants of mountainous areas may settle down there and cultivate their farm-land steadily.

In cultivated areas, endeavours of soil conservation should be made, for instance: planting based on the contour, terracing based on the contour, and establishment of ground covering growths, and so forth.

To execute these endeavours, intensive counselling will be required, in order to develop a conscience on the part of the people concerning the significance of land resources for their living.

2. Supportive measures

2.1. Food stuff; irrigation development.

Results of data analysis show that paddy field utilization for food stuff production increase, particularly paddy, has only attained 75 % of the total extent of paddy fields which is 9,000 ha. So this region had food (=rice) shortage of 1,189.48 tons in 1977. (Refer to appendix 21).

Consequently, in order to ensure the continuity of food crop production, particularly paddy, it is necessary to develop irrigation device, so that intensification through EIMAS/INMAS will be more perfect as a system of production increase.

The development of irrigation device, on the other hand, has to imply the fostering, development and counselling, integrated within the role of water management, aiming at a maximum and long-range utilization. Thus the policy to be taken should cover the following matters: restoration of irrigation device, development of simple irrigation, prevention of erosion/floods, and improvement of drainages, and on the other hand, introduction of varieties adapted to highlands and effective systems of organization and agricultural extension. Through those policies it is expected to expand the use of farmland areas so food shortage will be overcome.

3. Preventive measures and maintenance

3.1. Marketing.

Most agricultural commodities in this region have had no regular storage facility, particularly vegetables, in spite of their significance in interinsular/interprovincial trade.

Most of the surplus of these commodities are kept in the farmers' houses. Unfortunately, when the commodities are not much sold, the farmers would lose the merit of having produced those commodities, and they will not always produce more than before.

Transportation system between villages and kecamatan towns is in a relatively poor condition, and in such a circumstance it is extremely difficult to keep the equilibrium between supply and demand, and in case a price fluctuation occurs, the farmer will generally bear the risk. In addition, the systems of information and of production device distribution are in poor condition, which leads to a fluctuation in agricultural production in this region.

Relatively a lot of systems are found in the shipment of agricultural products, but most of them conduct business individually in stead of collectively, and therefore the farmers usually get a small share. Thus the policy for the development of agricultural output and input marketings should cover the following matters :

- a. Establishment of farmers' organizations and an effective extension system with qualified extension officers;
- b. The BUUD/KU's functions would probably be extended for other commodities and they should work for product collection as well as for the distribution of production device, and afterwards negotiate prices with tradesmen.
- c. After the expansion of the BUUD/KUD's functions, it would be necessary to establish a series of facilities such as transit centres, centres for collection and distribution, and facilities for storage and processing.
- d. For estate commodities, it would be necessary to clarify future demand and price forecast for those commodities in the marketing realm, because the prices of estate crop are affected by international prices.

3.2. Arrangement of grazing system and improvement of grasslands

Land utilization for livestock grazing field should be taken into consideration, viewing the condition of grasslands at present.

Livestock herding on steep sloping grasslands will lead to soil devastation and expansion of critical lands which will be hard to tackle. In order to overcome the above-mentioned problems, livestock herding locations should be regulated, so livestock would not graze arbitrarily on forest territories. In this case, attention would certainly be requested from the agencies concerned. Grasslands in Kabupaten Enrekang have a carrying capacity of 1.39 ha/head in 1977. Such a condition calls for serious attention, and grassland improvement is urgent for livestock development.

VI. STRATEGIES AND POLICY

1. S t r a t e g i e s

The Master Plan can be summarized as follows :

The main socio-economic problems in this region are :

- a. Shortage of food stuff to meet people's requirement.
- b. Underdeveloped communication device.
- c. Forest denudation and occurrence of critical lands.
- d. Lack of employment opportunity and people constraints in the agricultural sector.
- e. Restrict commerce.

Results of analysis indicate the following strategies to be significant for agricultural development in this region :

- a. Improvements of the communication system and marketing system in order to equalize income distribution;
- b. Formulation of a food stuff demand and supply plan in order to identify the people's consumptive needs;
- c. Conducting land reclamation, i.e. land utilization adjusted to its function and capacity;
- d. Increase of employment opportunity, mainly in the processing, marketing and transportation of agricultural products;
- e. Increase of agricultural income to employ agricultural labour force in rural sites based on efforts of intensification.

2. P o l i c y

2.1. Plan for target determination.

Based on the above-mentioned problems and strategies, the plan for the target of agricultural development in this region should cover the following items :

- a. Enhancement of food production for people's consumptive needs by improving irrigation, variety improvement, complete application of the Five Endeavours, and development of farmers' organizations by means of capable workers in an adequate number.
- b. Improvement and development of communication device, particularly economic roads in the rural sites in order to smoothen the transportation of agricultural products and the distribution of production device.

- c. Introduction and improvement of agro-processing methods in the context of quality improvement in agricultural products.
- d. Enhancement of reforestations and afforestation in critical lands, establishment of resettlement areas and safeguarding agricultural lands against hazards of flood and erosion.
- e. Substitution and development of tradeable commodities with the progress in marketing and transportation, based on locational suitability on unutilized agricultural lands.

2.2. Plan for measures determination.

On the basis of problem and strategy identification, plans should be formulated to attain the already decided target.

The programs necessary to attain those targets are :

1. Plan for food stuff increase :

- 1.1. Improvement of agricultural techniques, e.g. methods of soil cultivation, fertilization, pest/disease control and application of crops adjusted to the soil condition.
- 1.2. Breeding and introduction of top varieties adaptable to highlands (biological technology).
- 1.3. Intensive farming, i.e. multiple cropping, intercropping and mixed cropping, and crop rotation.
- 1.4. Soil utilization and improvement by improving irrigation device, improving drainages and improving inner soil condition.

2. Plan for labour force employment in agriculture :

- 2.1. Maximum utilization of agricultural areas by improving and upgrading irrigation device, improving drainages and safeguarding against floods and erosion.
- 2.2. Crop diversification, i.e. introducing diverse crops a year on upland fields and homeyards.
- 2.3. Specialization, i.e. specialization of each agro management e.g. livestock, fishery, and specific occupations in marketing and transportation.
- 2.4. Switching of farming pattern, i.e. from extensive farming to labour-intensive farming.

- 2.5. Home industry, i.e. handicraft, sericulture and agro-processing.
- 2.6. Improvement and enhancement of communication and irrigation by means of labour intensive system.
3. Plan for the increase of agricultural income.
 - 3.1. Increase of value through agro-processing and quality improvement
 - 3.2. Improvement of communication device, improvement of the systems for marketing and distribution of agricultural production device, mainly in commercial commodity locations.
 - 3.3. Intensification of soil productivity, e.g. by techniques of soil conservation, crop rotation, and improvements of irrigation/drainage system.
 - 3.4. Maximum utilization of farmlands for the development of commercial commodities based on the adjustability to the local soil condition, by means of safeguarding against hazards of flood and erosion.

Appendix 1. Trend of population growth in Kabupaten Enrekang
during 7 year (1971-1978)

Year	Population (jiwa)	Growth trend		In percent age per %	R e m a r k s
		Increase	Decrease		
1971	121,078	-	-	-	
1972	123,594	2,516	-	2.08	1) 10,812 - 2,542 = 8,270
1973	124,037	443	-	0.36	2) 8.66% - 1,94% = 6,72 %
1974	123,901	-	136	-0.11	
1975	125,866	1,965	-	1.59	
1976	129,797	3,931	-	3.12	
1977	131,754	1,957	-	1.51	
1978	129,348	-	2,406	-1.83	
Total	1,009,375	10,812	2,542	6.72	
Average	126,172			0.96	

Source: The Census & Statistics Office of Kabupaten Enrekang

Appendix 2: Number of Wet, moist and dry months during 5 years
at Stations in Kab. Marekang

Year	Wet months (mm)	Moist Months (mm)	Dry months (mm)	Remarks
1973	27	6	3	
1974	19	8	9	
1975	28	5	3	$Q = \frac{\text{Dry month}}{\text{Wet month}} \times 100 \%$
1976	17	6	8	$Q = \frac{7}{22} \times 100 \% = 31.81 \%$
1977	17	9	10	(Climate type C)
Total	108	34	33	
Average	22	7	7	

Source: Monography of Kabupaten Marekang and Marekang in Figures,
1976 & 1977

Appendix 3 : Temperature analysis at Sub-districts of
Kab. Enrekang

Kecamatan Centre	Calculation	Altitude (m)	Remarks
Belajen	$T = 26.3 - 0.61 \times 7.10$ $= 26.3 - 4.331 = 21.969^{\circ}\text{C}$	710	Formula: $T = 26.3 - 0.61 h$
Cakke	$T = 26.3 - 0.61 \times 5$ $= 26.3 - 3.05 = 23.25^{\circ}\text{C}$	500	
Baraka	$T = 26.3 - 0.65 \times 4.5$ $= 26.3 - 2.745 = 23.555^{\circ}\text{C}$	450	
Enrekang	$T = 26.3 - 0.61 \times 0.65$ $= 26.3 - 0.3965 = 25.9035^{\circ}\text{C}$	65	
Maroangin	$T = 26.3 - 0.61 \times 0.47$ $= 26.3 - 0.2867 = 26.0133^{\circ}\text{C}$	47	

Source: Monography of Kabupaten Enrekang
The Agricultural Extension Service.

Appendix 4: Monthly rainfall during 4 years at 3 Stations
in Kabupaten Inre kang

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1973	-	-	-	-	-	-	-	-	-	-	-	-
1974	170	587	147	427	522	328	454	105	375	487	594	266
1975	375	476	518	793	509	498	503	429	414	526	239	203
1976	339	250	405	478	305	407	145	90	64	530	372	415
1977	349	386	442	791	364	416	50	227	13	39	289	849
Total	1,233	1,699	1,512	2,489	1,698	1,669	1,152	851	1,366	1,455	1,492	1,755
Average	308	425	378	622	425	417	288	213	342	357	373	433

Source: Monography, and Burekang in Figures, 1975 & 1976

Appendix 5: Map on Soil types

L E G E N D

S H A P E

MAIN SUBSTANCE

SOIL TYPE

BROWN FOREST SOIL

1 H-F - $\frac{H-M}{T/s.O/S.s}$

Brown Forest Soil Complex of tuff, shale and sand Hilly to mountainous

MEDITERRAN

2 M. sb - $\frac{H-M}{S.l}$

Grayish Brown Mediterranean Limestone Hilly to mountainous

3 M. b - $\frac{H-M}{S.c/t}$

Brown Mediterranean Buffaceous shale - ditto -

YELLOWISH RED PODSOLIC

4 Pc. - $\frac{H-M}{T.E}$

Brown Podsollic Acid volcanic tuff - ditto -

5 Pc. b - $\frac{H-M}{S.S/S.c/T}$

Brown Podsollic Complex of Sandstone, Shale and tuff - ditto -

6 Pc.yb. - $\frac{H-M}{M.S}$

Yellowish brown podsollic S c h i s t - ditto -

7 Pc.yr. - $\frac{H-II}{S.S}$

Yellowish red podsollic Sandstone Undulated to hilly

8 Pc.yr. - $\frac{H-M}{T.a-i}$

Yellowish red podsollic Acid to intermediate volcanic tuff Hilly to mountainous

9 Pc.yr. - $\frac{H-M}{S.C,S.C}$

Yellowish red podsollic Sandstone and shale - ditto -

10 Pc - $\frac{H-II}{S.C.S.S}$

Violet podsollic Shale and sandstone - ditto -

11 Pc.gb/te - $\frac{R}{S.B,T}$

Complex of grayish brown podsollic and Regosol Sandstone and tuff Undulated

Source: Bogor Institute of Soil Investigation

Appendix 6: Labour force in each Kecamatan of Kabupaten
Enrekang, 1975

No.	Kecamatan	Number of labour force (15-45 years)				Population of 1975
		Male	Female	Total	%	
1.	A l l a	7,998	8,428	16,426	24.8	125,866
2.	Anggeraja	5,917	5,566	11,483	17.4	
3.	Baraka	5,874	6,061	11,935	18.0	
4.	Enrekang	7,992	7,986	15,978	24.2	
5.	Maiwa	4,868	5,470	10,338	15.6	
Total		32,649	33,511	66,160	100	52.56 %

Source: Monography of Kabupaten Enrekang,
Kabupaten Enrekang Agricultural Extension Service, 1975.

Appendix 7: Employment field in Kabupaten Breckang
in 1974

No.	Type of occupation	Employment field available (manpower)	Percentage
1.	Agriculture	24,752	80.3
2.	Commerce	619	2
3.	Industry	1,855	6
4.	Civil Servant	2,317	7.5
5.	O t h e r s	1,296	4.2
T o t a l		30,839	100

Source: Report on Study of the Development of the Pare-Pare zone,
DAPPERDA of South Sulawesi, 1975 / 1976

Appendix : 8. Condition and types of Agricultural Cooperatives
(BUUD/KUD) in Kabupaten Enrekang, 1977

Types of Cooperatives	Condition		Total	Location/
	active	passive		
1. Kalosi coffee farmers' cooperative	-	1	1	Kalosi
2. Masedi Atie Animal Husbandry cooperative	-	1	1	-
3. Maiwa Smallholders' Animal Husbandry Cooperative	-	1	1	Maiwa
4. Mata Allo Sericulture Cooperative	-	1	1	Alla
5. Cakke livestock pasture Cooperative	1	-	1	Cakke
6. BUUD/KUD Bamba Puang	1	-	1	Cakke
7. BUUD/KUD Karbiolangi	1	-	1	Alla
8. BUUD/KUD Gaurisulo	1	-	1	Maiwa
9. BUUD/KUD Tirowali	1	-	1	Baraka
10. BUUD/KUD Condana	1	-	1	Enrekang
Total	6	4	10	

Source : Kabupaten Enrekang in figures, 1977.

Appendix : 9. Population density by each Kecamatan in
Kabupaten Enrekang, 1978

Kecamatan	Population (man)	Extent of region(Km ²)	Density (man/Km ²)	Extent of farm land(Ha)	Agrarian density (Ha)
Enrekang	31,223	388	80.47	9,028	0.29
M a i w a	19,859	582	34.12	7,546	0.38
Anggeraja	22,928	243	94.35	5,037	0.22
A l l a	32,804	388	84.55	5,855	0.18
B a r a k a	22,535	340	66.28	5,990	0.27
T o t a l	129,348	1,941	359.77	33,456	1.34
Average	25,870	388	71.95		0.27

Source : The Census & Statistics Office of Kabupaten Enrekang.

Appendix : 10. Estimation of labour force condition in 1978
by each Kecamatan in Kabupaten Enrekang

No.	Kecamatan	Number of Labour force (15-45 year)				Population of 1978
		Male	Female	Number	%	
1.	A l l a	8,211	8,649	16,860	24.8	129,348
2.	Anggeraja	6,092	5,737	11,829	17.4	
3.	B a r a k a	6,021	6,216	12,237	18.0	
4.	Enrekang	8,234	8,218	16,452	24.2	
5.	H a i w a	4,995	5,611	10,606		
T o t a l		33,553	34,431	67,985	100	52.56 %

Source : Based on 1975 data on labour force, Monography of
Kabupaten Enrekang, Kabupaten Enrekang Agricultural
Extension Service (Refer to Appendix 6).

Appendix : 11. Estimation on employment field in Kabupaten
Birekang in 1978.

No.	Type of occupation	Available employment field (manpower)				Population	
		1974	%	1978	%	1974	1978
1.	Agriculture	24,752	80.3	25,756	80	123,901	129,348
2.	Commerce	615	2	644	2		
3.	Industry	1,855	6	1,932	6		
4.	Civil Servant	2,317	7.5	2,575	8		
5.	O t h e r s	1,296	4.2	1,288	4		
T o t a l		30,839	100	32,195	100	25 %	25 %

Appendix : 12. Rivers and weirs/irrigation at the rivers
in Kabupaten Enrekang.

No.	River name	Width(+ m)	Origin	Number of weirs/ irrigation	Remarks
1.	Saddang	50/75	Tana Toraja		
2.	Mata Allo	15/20	Tana Toraja		
3.	Kalosi	10/15	Tana Toraja		
4.	Malua	20/25	G. Latimojong	1 irrigation	
5.	Pasui	10/15	Dante Leno	1 irrigation	
6.	Bungin	20/25	M a b u		
7.	Karajae	10/15	Batu Mala		
8.	Arang/Ampunc	10/15	Battu Londa2		
9.	Baraka	10/15			

Source : Kabupaten Enrekang Forestry Service.

Appendix : 13. Farmland potency according to the use in Kabupaten
Burekang in 1977.

No. Kecamatan	Wet Paddy field				Dry Fields				Extent of farm (Ha.)	
	Technical irrigation	Semi Technical irrigation	Village	Wet Paddy field	Upland field	Dry Paddy field	Home yard	Extent of dry land		
1. Lili	-	-	700	2,200	2,900	1,359	1,226	370	2,955	5,855
2. Anggeraja	-	-	712	380	1,092	1,646	2,100	199	3,945	5,037
3. Berek	-	-	1,272	1,528	2,800	1,730	1,352	108	3,190	5,990
4. Burekang	-	-	354	666	1,000	1,978	5,462	508	8,028	9,028
5. Maw	-	-	250	958	1,208	2,800	3,854	94	6,748	7,556
Total	-	-	3,260	5,732	9,000	9,513	13,994	1,359	24,866	33,866

Source : Kabupaten Burekang Agricultural Extension Service.

Appendix : 14. Potency of roads, bridges/Duiker and number of Villages
per Kecamatan in Kabupaten Enrekang in 1977.

No.	District	Road condition		Bridge Condition		Emergency		Condition		Village
		Rehabilitated	Paved	Rehabilitated	Paved	Total	Emergency	Permanent	Total	
(Km)	(Km)	(Km)	(Km)	(Km)	(Km)	(Km)	(Km)	(Km)	(Km)	(Km)
1.	Enrekang city	2	8	3	4	7	7	6	13	Alla
2.	Enrekang-Penja	1.5	2	3.5	2	4	4	2	6	
3.	Enrekang-Kuka	3	-	3	-	1	2	-	2	
4.	Enrekang-Randangan	-	1.5	3	1	1	-	4	4	Baraka
5.	Kota-Gakke	1.5	0.5	3	1	1	4	5	9	
6.	Calico-Baraka	-	10	10	6	6	4	7	11	
7.	Baraka city	3	-	3	1	1	4	4	8	
8.	Baraka-Pasui	5	-	6	1	1	7	4	11	
9.	Baraka-Banti	5	2	7	2	5	5	3	8	Enrekang
10.	Baraka-Malus	1	3	4	-	-	3	-	3	
11.	Kalosi city	-	1	2	-	-	5	-	5	
12.	Sudu city	3	-	4	-	-	5	1	6	
13.	Maroangin city	3	-	3	-	-	4	3	7	Haiwa
14.	Sudu-Baroko	1.5	3.5	5	1	1	9	7	16	
15.	Maroangin Dolla	10	3	13	1	8	6	7	15	
Total		59.5	24.5	79.5	11	36	69	53	122	20
Percentage		49.7	30.8	100	69	100	57	43	100	

Source : FUD Office of Kabupaten Enrekang.

Appendix 15: Distribution of Soil type by Kecamatan
in Kabupaten Dati II Enrekang

No.	Kecamatan	Soil Type (Ha)			Extent of the area
		Brown Forest soil	Podzolik	Mediteran	
1.	A l l a	-	28,800	10,000	
2.	Anggeraja	-	14,700	9,000	
3.	B a r a k a	-	35,500	500	
4.	Enrekang	3,100	29,300	6,400	
5.	H a i w a	-	57,700	500	
T o t a l		3,100	164,000	27,000	194,100
Percentage		0,16	84,49	13,9	100

Source: Kabupaten Enrekang Agriculture Extension Service

Appendix : 16. Land-use in Kabupaten Enrekang in 1977

No.	Type of land-use	Extent	%
1.	Paddy field	9,000	4.6
2.	Dry land	24,066	12.8
3.	Grass land	53,657	27.6
4.	Forest	73,250	37.7
5.	In land fishery	100.5	0.05
6.	Other uses	33,266.5	17.1
T o t a l		1,941.00	100.00

Source : 1, 2 and 5. Kabupaten Enrekang Agricultural
Extension Service

4. Kabupaten Enrekang Forestry Service.

Total : The Kabupaten Enrekang Census &
Statistics Office.

Appendix 17 Food stuff production development trend during 5 years,
1973 - 1977 in Kabupaten Dati II Enrekang

No.	Commodity	1973 production (ton)	1974 production (ton)	1975 production (ton)	1976 production (ton)	1977 production (ton)	Total production (ton)	Average production (ton)	Trend (%)
1.	Paddy	19,193	13,737	23,371	31,136	25,098	112,590	22,518	19.5
2.	Corn	6,225	2,031	2,215	2,337	2,978	15,786	3,157	-13.6
3.	Cassava	7,582	8,304	11,082	7,874	11,017	45,859	9,172	5.9
4.	Sweet potato	445	413	363	258	550	2,029	406	-2
5.	Peanut	555	397	229	282	536	1,779	356	3.8
6.	Beans	130	82	87	160	284	1,417	143	6.2

Source: Kabupaten Enrekang Agriculture Extension Service

Appendix: 18 Food stuff planted area development trend during
5 years, 1973 - 1977 in Kabupaten Lati II Enrekang

No.	Commodity	1973	1974	1975	1976	1977	Total planted area (Ha)	Average planted area (Ha)	Trend (%)
		planted area (Ha)	planted area (Ha)	planted area (Ha)	planted area (Ha)	planted area (Ha)			
1.	Paddy	5,067	4,013	6,053	6,360	6,761	21,493	4,299	13.1
2.	Corn	7,640	2,838	5,399	3,363	4,543	22,003	4,401	-9.5
3.	Cassava	942	1,102	1,470	896	976	5,386	1,077	-2.9
4.	Sweet potato	82	93	77	60	124	436	87	1.5
5.	Peanut	466	475	173	403	841	2,358	472	15.1
6.	Beans	181	129	340	214	433	1,583	276	

Source: Kabupaten Enrekang Agriculture Extension Service

Appendix 19 : Trend of Food crop yield development in Kabupaten Brekang during 5 years, 1973 - 1977

No. Commodity	1973 Yield (ton/ha)	1974 Yield (ton/ha)	1975 Yield (ton/ha)	1976 Yield (ton/ha)	1977 Yield (ton/ha)	Total Yield (ton/ha)	Average Yield (ton/ha)	T r e n d (%)
1. Paddy	3.79	3.44	3.86	4.90	3.71	19.70	3.94	3.9
2. C o r n	0.79	0.72	0.65	0.69	0.66	3.51	0.70	-3.7
3. Cassava	8.05	7.54	7.54	8.79	11.29	43.21	8.64	5.6
4. Sweet potato	5.43	4.44	4.71	4.30	4.44	23.32	4.66	-4
5. Pecnut	0.72	0.64	0.26	0.75	0.66	3.03	0.61	3.9
6. Beans	0.72	0.64	1.32	0.70	0.64	4.22	0.64	

Source: Kabupaten Brekang Agriculture Extension Service

Appendix : 20. Extent of paddy field areas in Kabupaten Enrekang, 1977.

No.	Kecamatan	Paddy field (Ha)		Extent of paddy-field
		Village irrigation	Rainfed	
1.	A l l a	700	2,200	2,900
2.	Anggeraja	712	380	1,092
3.	B a r a k a	1,272	1,528	2,800
4.	Enrekang	334	666	1,000
5.	M a i w a	250	958	1,208
T c t a l		3,268	5,732	9,000
Percentage		36	64	100

Source : Kabupaten Enrekang Agricultural Extension Service.

Appendix 21 : Analysis of food demand on the basis of average production in 1976 - 1977 in Kabupaten Banteng

No.	Commodity	Average production 1976-1977 (ton/year)	Demand percapita/year (ton)	Total demand (ton)	Surplus (ton)	Shortage (ton)	Population
1.	Rice	14,621	0,120	15,810	-	1,189	131,754
2.	Corn	2,659	0,023	3,030	-	373	
3.	Cassava	9,446	0,049	6,456	2,990	-	
4.	Potato	2,763	0,026	3,426	-	663	
5.	Peanuts	409	0,005	6,659	-	250	
6.	Beans	222	0,011	1,449		1,227	
7.	Vegetables	7,527	0,033	4,348	3,179		
8.	Meat	86	0,008	1,054	-	968	

Note: Meat (Cattle, Buffalo, horse, goat and chicken)

Appendix 22 Trend of Estate crop production development in Kabupaten Enrekang during 5 years 1973 - 1977

No.	Commodity	1973 production	1974 production	1975 production	1976 production	1977 production	Total production	Average production (ton)	Trend (%)
1.	Cocunut	239	378	382	455	259	1,713	343	+9
2.	Coffee	433	223	582	106	377	1,721	344	-9.7
3.	Candlenut	676	582	374	546	510	2,688	538	-5.7
4.	Capok	68	71	84	32	27	282	56	-24.6
5.	Clove	-	-	-	2	3	5	2.5	50
6.	Pepper	32	18	71	0.70	11	133	27	-25.6

Source: Kabupaten Enrekang Estate crop Service

Appendix 23 Development trend of Estate crop planted areas in
Kabupaten Enrekang during 5 years, 1973 - 1977

No.	Commodity	1973 planted area	1974 planted area	1975 planted area	1976 planted area	1977 planted area	Total planted area	Average planted area	T r e n d (%)
1.	Coconut	1,110	1,15	1,154	1,156	1,156	6,107	1,221	-4.3
2.	Coffee	1,680	1,703	1,845	1,583	2,030	8,841	1,768	2.2
3.	Candlenut	1,703	1,723	1,767	1,867	1,869	8,929	1,786	4.5
4.	Capok	222	220	387	486	386	1,701	340	25.4
5.	C l o v e	46	171	182	711	1,492	2,602	520	19.5
6.	Pepper	68	58	82	56	71	335	67	0.5

Source: Kabupaten Enrekang Estate Crop Service

Appendix 24 Trend of Estate Crop yield in Kabupaten Enrekang during 5 years, 1973 - 1977

No.	Commodity	1973 Yield (ton/ha)	1974 Yield (ton/ha)	1975 Yield (ton/ha)	1976 Yield (ton/ha)	1977 Yield (ton/ha)	Total yield (ton/ha)	Average (ton/ha)	Trend (%)
1.	Coconut	0.22	0.25	0.33	0.39	0.22	1.41	0.28	8,9
2.	Coffee	0.26	0.13	0.32	0.07	0.19	0.97	0.19	-13,3
3.	Candlenut	0.40	0.38	0.21	0.29	0.27	1.55	0.31	-10,5
4.	Capok	0.31	0.32	0.22	0.07	0.07	0.99	0.20	-11
5.	C l o v e	-	-	-	0.003	0.002	0.005		
6.	Pepper	0.47	0.31	0.87	0.01	0.15	1.81	0.36	-11,5

Source: Kabupaten Enrekang Estate Crop Service

Appendix : 25. Vegetable growth trend in Kabupaten Enrekang from 1974 to 1977.

No.	Commodity	'Production 'in 1974 ' (ton)	Produc- tion in ' 1975	'Production ' in 1976	'Production ' in 1977	Annual growth rate %
1.	Potato	2,737	2,231	2,184	3,343	3.6
2.	Cabbages	2,340	2,045	2,556	3,783	13.1
3.	Leek	1,918	3,006	3,257	2,479	5.2
4.	Onion	835	1,021	1,397	761	5.1
5.	Beans	393	1,250	615	545	11
T o t a l		8,223	9,553	10,009	10,911	
Percentage						5.6

Source : Kabupaten Enrekang Agricultural Extension Service.

Appendix : 26. Distribution of vegetable locations in Kabupaten Enrekang from 1974 to 1977

No.	Kecamatan	Extent of 'crops in ' 1974 (Ha)	Extent of 'crops in ' 1975(Ha)	Extent of 'crops in ' 1976(Ha)	Extent of 'crops in ' 1977 (Ha)
1.	A l l a	859	1,092	940	1,391
2.	B a r a k a	766	772	500	341
3.	Anggeraja	214	158	299	365
4.	Enrekang	58	79	119	169
T o t a l		1,897	2,101	1,788	2,266

Source : Kabupaten Enrekang Agricultural Extension Service.

Appendix 27: Estimation of animal population and meat consumption in Kabupaten Dati II Enrekang in 1983 and 1988

Year : 1983

No.	Animal kind	Population 1977 (head)	Average growth (1973-1977) %	Population 1983 (head)	Intensulair export %	Intensulair export (head)	Slaughter	Consumption (ton)	Consumption/capita/year		
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1.	Cattle	21,012	11.1	25,089	5	1,254	5	1,254	125,400		
2.	Buffalo	10,127	9.2	14,365	1	143	5	718	107,737	4.62 KG	
3.	Horse	6,869	9.3	10,900	-	-	2	218	21,800		percapita
4.	Goat	21,089	7.1	23,749	5	1,187	8	1,899	18,990		
5.	Chicken	294,122	120.0	394,151	-	-	125	492,688	369,516		

Source: Enrekang animal Husbandry Service.

Year : 1988

1.	Cattle	25,089	13	28,254	4	1,130	10	1,695	282,540		
2.	Buffalo	14,365	12	18,176	1	182	10	1,005	272,640	7.96 KG	
3.	Horse	10,900	10	14,607	-	-	5	316	36,060		percapita
4.	Goat	23,749	15	30,050	4	1,202	12	3,005	73,000		
5.	Chicken	394,151	130	582,200	-	-	125	660,250	495,187		

Appendix : 28. Comparison of transportation costs in vegetable marketing in Kecamatan Alla as case study in 1977.

No	Type of transportation	Distance/Volume Kg/Km	Cost (Rp)
1.	On horse back	1 Kg/Km	1.5
2.	By car	1 Kg per 5 Km	1.5

Source : Primary data.

Appendix : 29. Utility and plan for improvement of
Communication device in Kabupaten
Enrekang

No.	Village	Population	Extent of farm land			Length of road (Km)	Location of road network
			Paddy field	Dry land	Total		
1.	Baraka	5,014	192	619	811	11	Baraka-B Alla
	B. Alla	3,353	365	830	1,195		
2.	Buntu Barana	3,232	210	209	419	6	Karangan- Balabatu
3.	B a n t i	4,599	411	2,904	3,315	18	Banti-Bungin
	Bungin	2,958	242	817	1,059		
4.	Buttu Datu	6,246	255	1,613	1,868	6	Malewa-Papi
5.						5.6	Kulijang- Tungga
6.	Pasang	2,200	145	690	835	11	Enrekang-Pasang
	Galonta	4,959	97	1,389	1,486		
7.	Tuncung	3,128	167	974	1,141	7.5	Maroangin-Bolli
T o t a l		32,788	2,084	10,045	12,129	65.1	

