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DEPARTMENT OF MANPOWER AND TRANSMIGRATION
DIRECTORATE GENERAL OF TRANSMIGRATION
PROJECT LUWU SOUTH SULAWESI
INDONESIA

THE ECONOMY OF KABUPATEN LUWU
SOUTH SULAWESI

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CHECCHI / DMJM

PREFACE

This report is intended to be the basis upon which an intermediate term development plan from 1984-1985 to 1988-1989, together with a perspective plan to the year 2000 can be formulated. Effort has been made to determine impediments to development as well as what might be done to overcome them. To this end, 15 of the 16 Camats and officials of pertinent agencies were contacted to determine their attitudes toward the development process, identify their problems, and determine existing programs.

Project Luwu staff involved in the implementation of the subprojects of the special development program now underway have commented upon them. These comments, shown as section 10, have been edited for form but not content. Exceptions to this are the sections covering the rural electrification and roads programs. In the case of the Larompong-Palopo and the Palopo-Malili roads, the consulting engineers were interviewed and the information included is the result of these interviews. Information concerning Kabupaten roads was extracted from a recently completed reconnaissance study of local roads by Louis Berger International. Comments concerning the Berger study are a compilation of those of people representing several disciplines on the Project Luwu staff.

This report is no doubt considerably more detailed than needed by the typical reader. This level of detail will hopefully make it unnecessary for technical personnel preparing the development plan to refer to source documents.

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1. Introduction

Kabupaten Luwu is an area of 25,144 square kilometers. It is located northeast of Ujung Pandang on the island of Sulawesi in the Indonesian archipelago. The Kabupaten is situated on the Northeastern littoral of the province of South Sulawesi.

The principal city in the Kabupaten is Palopo which is the administrative center for the area. The Kabupaten contains 16 administrative areas or Kecamatans. They contain many villages located principally along the road connecting Larompong in the south and Malili to the northeast (figure 1).

The scope of this document is limited to Kabupaten Luwu. Its purpose is to provide a description of the economy, the development program now underway, and a listing of the facilities required for development which are available and/or the lack of them. This information will be used as the background and framework upon which a development plan can be formulated.

1.1. History of Development

The North Luwu Plain was designated in the 1930's as an area to which migrants could move from the more populous islands of Indonesia. Work was begun in that period on construction of roads, clearing land for agriculture, and irrigation systems. The advent of World War II in the

1940's and subsequent political problems interrupted and delayed these activities.

The area was later designated as one of the Government of Indonesia's 100 growth areas. This is appropriate since it is undeveloped and sparsely populated relative to its potential.

Efforts toward development of the region were begun anew in the mid-1970's. Some of the irrigation systems are now being renovated and expanded, programs to provide supporting services to agriculture are underway, the road between Larompong and Malili is being improved, and the physical and social infrastructure are being developed.

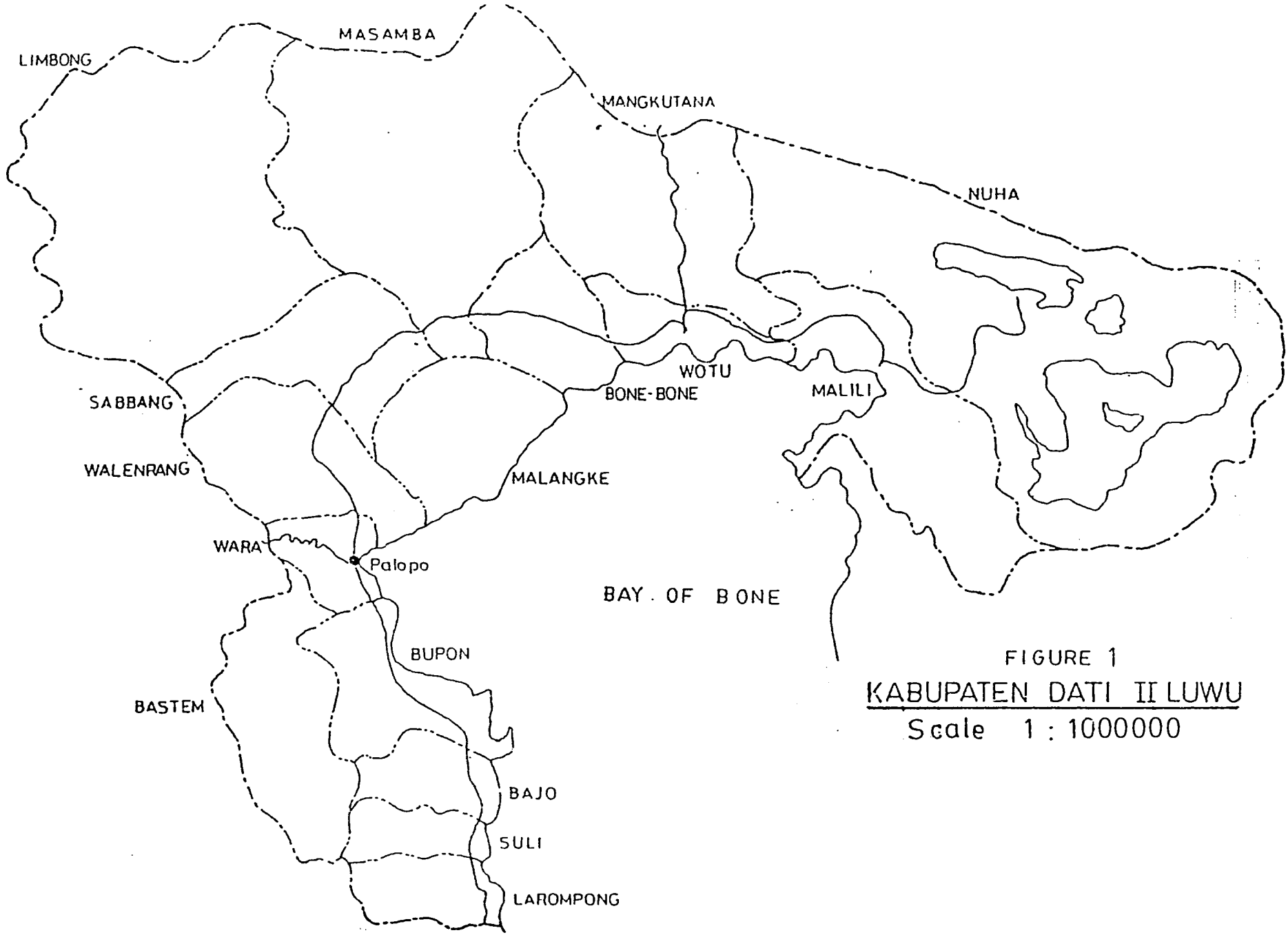

FIGURE 1

KABUPATEN DATI II LUWU

Scale 1 : 1000000

2. Summary

Kabupaten Luwu is an administrative and geographical region of 25,144 square kilometers. The area is relatively sparsely settled with a population estimated to be 521,500 at year end 1981. The population grew at an annual rate of 4.8 percent per year from 1970 to 1980. This high rate reflects in part the unmeasured but significant amount of government sponsored and spontaneous in-migration during the period. While the greatest numerical increase in population in the decade was associated with food farms, the most marked relative increase reflected growth of the mining industry.

Historically, Luwu has been a target area for the transplantation of population from the more densely populated islands. Between 1970 and 1981, 42,744 persons arrived from other islands under government sponsorship.

The economy is primarily agricultural with rice being the principal crop grown. Agricultural land in 1980 amounted to 132,400 hectares of which 53,400 hectares were devoted to lowland rice, 16,100 hectares to upland rice and field crops, and 55,100 to estate crops. The amount of undeveloped land with possible economic significance is large being 787,000 hectares. More information is needed concerning this land to evaluate its economic potential.

The output of the timber industry amounted to Rp. 12 million in 1980. Fifty-four sawmills plus a number of individuals and families are engaged in the forest products industry.

The principal mining operation in Luwu is nickel mining and processing. Other mineral deposits are present with the most promising being copper deposits on the border with Kabupaten Tana Toraja. The latter are not believed to be financially feasible for development at present.

Fish from fish culture and natural sources provide an important supplement to the diet of the population. The fish harvest in 1981 was 18,700 tons with 75 percent of this amount coming from the Bay of Bone. Government has programs under way to assist fishermen improve their catch and increase production by fish culture. The annual harvest of fish from the Bay of Bone is now 1.4 tons per fisherman. The development objective is to increase this to 2.0 tons in 1983-1984. This target is unlikely to be met.

Over four-fifths of the farmers own the land they till. Farm size exceeds 1.1 hectares on average. Traditional methods of tilling crops are used. Tractors numbered 213 in the Kabupaten in October 1982 and almost one-fifth of these were inoperative.

Labor is considered to be in short supply throughout the Kabupaten. This is because of several factors including

migration of youth from the farms, the development of the educational system which competes for the time of potential farm labor, and the decline in draft animals because of competition from fish ponds and estate farms for forage areas. Farm mechanization will thus be a significant factor in the development program.

Overall 75 percent of the lowland area or sawah was under irrigation in 1980. Practically all of this is represented by village irrigation systems developed by the farmers themselves. Camats consider these systems to be in poor condition. It appears many of the village systems provided only enough water to supply supplementary moisture for rain fed rice rather than enough to produce a second crop during the year.

Sawah cropping intensity in 1981 is estimated to be 116. This is relatively low for Asia. The level in Kecamatan Bone Bone, an area which is being provided with an engineered irrigation system, farmer education, and the availability of improved farm inputs, was 215.

The use of farm inputs such as chemicals and seeds is increasing rapidly throughout most of the Kabupaten. The amount purchased in 1981-1982 totalled Rp. 385 million in constant prices compared to Rp. 30 million 10 years previous. The FCCs, a recently formed cooperative organization under the special development program, supplied

substantial portions of these inputs in the areas in which they operated.

Hectares of paddy planted have been increasing rapidly during the period of record. This reflects the development of new land as well as a recent tendency to grow a second crop in areas with adequate irrigation systems. Rainy season rice planted since 1974 has increased 7 percent per year to 47,000 hectares in 1981; dry season rice 33 percent per year from a very small amount in 1974 to 15,200 hectares in 1981; and ladang or upland rice, which is rain fed, increased 14 percent per year to 10,700 hectares in 1981. Total hectares of paddy planted in 1981 was 72,700 hectares. Yields of paddy are lower in the Kabupaten than in the Province as a whole.

Multiple regression analysis indicates that the most significant factors affecting paddy production per hectare of available lowland rice land are engineered irrigation systems and improved farm inputs which implies ancillary farmer education. Camats, without exception, stated that more engineered irrigation systems as well as improvements in existing village systems were badly needed to improve cultivators' lot.

The Lappo Ase program introduced in Luwu in the 1981 dry season has been successful. While plantings were up only 5 percent, yields according to early reports, are up

substantially. This demonstrates the benefit which can be derived from a coordinated effort of government organizations.

Using past trends and data for South Sulawesi as guides, it is estimated paddy production could nearly double between 1981 and 1988 to be 431 thousand tons. To do this will require support by government to provide farmers with more and better irrigation systems, make available farm inputs including mechnical equipment, and continue the extension service program.

There has been little interest in growing field crops such as maize, soybeans, and cassava, on rice land during the dry season because of tradition and possible destruction by wild pigs and untended livestock. Growing these crops on rice land during the dry season should be encouraged particularly in areas where insufficient irrigation water is available for a second rice crop.

There is a trend toward increased growth of estate crops. Two large palm oil plantations are in development. Hybrid coconut is being introducted. Many small clove groves are being planted.

Industry is not well developed in Luwu. The only one of significance in addition to nickel smelting is a plywood factory employing 640 workers.

The physical infrastructure is being improved somewhat. While a nearly completed asphalted road now traverses the Kabupaten, local roads are primitive. Three kecamantans are not linked to the rest of Luwu by all weather roads passable by four-wheel vehicles. Port facilities for small vessels are available at Palopo. Telecommunications facilities are limited.

The electric power system needs to be improved. While many towns are now electricifed, some systems are in poor condition and most do not provide service during daylight hours. The capacity of the Palopo system is marginally adequate but service standards are poor. According to reports, a major potential hydroelectric generating facility is being studied in Kecamatan Malili. Power from this will be exported to Southeast Sulawesi.

The education facilities have been expanded rapidly. Both facilities and teachers are a constraint. At the beginning of 1981-1982, 9 of the Kecamatans did not have high schools and one did not have a secondary school. Data at that time indicated that 42 percent of the school age population was not enrolled. Student/teacher ratios are high particularly in the basic school system.

Health facilities need to be expanded. Both facilities and manpower are required. There were two government hospitals, 11 doctors and 293 nurses in the Kabupaten in 1980-1981.

The development expenditure in 1981-1982 was Rp. 15 billion... The biggest portion of this or 38 percent was expended for irrigation facilities while 25 percent was devoted to transportation and 11 percent to education.

A special development program is under way. This is the foreign-aided program. It includes the backbone road from Larompong to Malili and a reconnaissance level study of Kabupaten roads; irrigation; transportation; a cooperatives program to promote the use of improved farm inputs; a rural extension program; a rural electrification program; and a training program. With the exception of the highway project between the Kabupaten Wajo border and Palopo, all of the projects have been confined to North Luwu.

The following are recommendations arising from this review of Kabupaten Luwu:

1. The development program should be expanded geographically to cover the entire Kabupaten.

2. A study is needed to determine present land use and to develop reliable estimate of land resources and their potential uses. Attention needs to be given to use of watershed areas to ensure that erosion is controlled.

3. In general, expansion of (1) irrigation, (2) provision of farm inputs, and (3) farmer education programs are needed. Multiple regression analysis indicates these are the areas that most influence rice yields.

4. The irrigation program should continue to be expanded. Technical assistance for small irrigation schemes with much of the labor performed by farmers should receive emphasis. Larger projects will be necessary in areas where water must be imported. In the meantime, an extension service oriented toward irrigation to help farmers improve and manage existing village irrigation systems should be undertaken.

5. A study of water resources should be made to determine best uses considering irrigation, hydroelectric power, flood control and fishing. This would include updating and extending the existing "Master Plan" to include South Luwu.

6. Irrigation project design criteria and standards should be reviewed and revised as required.

7. Better measures of control of the irrigation construction program must be developed and exercised.

8. A management plan for heavy irrigation construction must be developed.

9. A logical means of transfer of completed irrigation systems to the Provincial Department of Public Works must be developed. This includes provision of realistic funding for operation and maintenance.

10. The FCCs appears to be operating very successfully and the scope of their geographical area of activity should

be expanded. Policy concerning the relationships between the FCC and the KUDs, DOLOG, and the BRI should be defined. The organizational status of the FCCs need clarification.

11. Coordination of the several organizations offering extension services needs to be addressed. The efforts of the research organizations also need to be coordinated. Farmers need more market information.

12. The individual REC programs should be evaluated to determine their worth to the development of Luwu.

13. Ways must be found to encourage farmers to grow more field crops including efforts to determine ways to overcome existing crop losses.

14. More seed propogation and its distribution to farmers is needed.

15. Methods of making operable farm machines available to farmers must be developed. Mechanization is necessary if additional potential land in Luwu is to be brought under cultivation.

16. All aspects of the physical and social infrastructure need to be improved and expanded. The kabupaten roads plan recently developed by a Consultant needs to be extensively revised before it is usable for planning. Consideration should be given to allocation to Luwu of a portion of the generating capacity of the proposal hydroelectric facility in Kecamatan Malili if it is constructed.

17. Efforts must be made to determine industrial potential of Luwu as well as policies and other actions government can take to develop this sector.

18. The BAPPEDA office needs to clearly delineate the functions of planning, budgeting and program control in its organizational structure.

3. Physical Characteristics

3.1. Terrain

The Kabupaten surrounds the north and northwestern shoreline of the Bay of Bone and is comprised of an alluvial plain bourded on the west and north by foothills and the mountains of central Sulawesi. The land between the mountains and the Bay is flat and tends to be marshy in some areas. It is traversed by numerous streams flowing from the mountains to the Bay.

Drainage is a problem in some areas making them unsuitable for development as agricultural land. In substantial parts of the North Luwu Plain, the area now being given development priority, soils are poor to moderately drained. This will make construction of a well-managed irrigation scheme rather costly.[1]

3.2. Climate

The climate is typical of tropical areas and is warm and humid the year round. Rainfall records are available for some sites in the Kabupaten for the period to 1907. Record-keeping was interrupted at the beginning of World War II and was not resumed until the 1950's at most stations and

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[1] Ilaco, "Master Plan, Irrigation Development for North Luwu Plain, Sulawesi Selatan", March 1977, p. 75.

1971 in the case of Wotu/Tarengge. There was also an interruption during the 1960's. In most cases, however, a total of about 30 years of records is available.

As shown in table 3.1, the average annual rainfall increases from 1,736 millimeters at Bajo/Belopa in the southern portion of the Kabupaten to 3,595 millimeters at Mangkutana and 3,611 millimeters at Masamba. The month with the most rainfall is either April or May. The one with the least is September or October. Lamasi is an exception to this in that the month with the least precipitation is August. Monthly precipitation varies considerably from year-to-year.

Rainfall varies depending upon elevation. It increases 800 millimeters on average for each 500 meters increase in elevation above sea level.[1]

3.3. Hydrology and Water

There are 22 rivers traversing the Kabupaten. They originate in the nearby mountains and the catchment areas are relatively small. Data concerning discharge of these rivers are rather meagre. From the information which is available, minimum flows have been calculated using correlation techniques based upon the flows of the Kalaena River for which some data are available. This information

[1]Loc. Cit., p. 23.

has been used to plan irrigation systems in the North Luwu Plain.

The streams meander as they near the Bay and frequently change course. Drainage is poor in those areas. Dependable flows in quite a number of small rivers are low to very low. These flows will have to be augmented from other rivers during critical periods of the growing season if the nearby areas are to be irrigated. Development of these marginal areas would logically be scheduled at a later date if their irrigation is found to be technically feasible and economically justified.[1]

3.4. Physical Resources

3.4.1. Land and Land Use

3.4.1.1. Soils

The soils are composed of alluvia which have been deposited by the streams originating in the nearby mountains. The terrain is undulating near the foothills and flatter near the Bay. Drainage is poor near the Bay.

The soils are saline in the areas near the coast where there is tidal flooding. These areas will require reclamation before they will be suitable for rice cultivation. Older alluvial soils are at higher elevations and are above irrigation levels.

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[1] Loc. Cit., p. 75.

TABLE 3.1

MEAN RAINFALL BY MONTH IN MILLIMETERS AT SELECTED STATIONS

	Bajo/Belopa	Palopo	Lamasi	Masamba	Bone Bone	Wotu/Tarengge	Mangkutana
January	128	204	175	331	164	172	350
February	150	222	223	321	225	204	303
March	217	288	265	386	222	246	435
April	227	318	362	428	306	371	442
May	188	323	316	397	391	294	445
June	178	250	271	361	257	219	311
July	140	188	196	233	242	237	258
August	96	153	160	229	262	194	233
September	81	135	164	192	173	113	94
October	62	158	168	155	119	116	201
November	137	232	211	226	150	195	230
December	132	248	231	352	172	172	293
Total	1,736	2,719	2,742	3,611	2,683	2,533	3,595

SOURCE: DHV Consulting Engineers, "100 Years of Rainfall Recording in South Sulawesi 1979-1980", March 1981.

The areas which can be irrigated are composed of silt loam, fine sandy loam and small areas with a coarser texture. These soils are recent alluvia.

The land in the North Luwu Plain has been classified relative to its suitability for rice cultivation by applying the methods formulated for national use in Indonesia. A summary of the results of this is shown in table 3.2.

TABLE 3.2

LAND IN NORTH LUWU PLAIN CLASSIFIED AS TO SUITABILITY FOR WET LAND RICE CULTIVATION (EXCLUDES KALAENA LEFT BANK)

		Hectares	Percent of Total
I	Very suitable	-	-
II	Suitable	81,250	46.4
II/III	Suitable and marginally suitable	48,000	27.4
IV	Conditionally suitable	9,400	5.4
V	Unsuitable	29,250	16.7
	Total	167,900	95.9
	Village with home gardens	7,100	4.1
	Grand total	175,000	100.0

SOURCE: "Master Plan, Irrigation Development for the North Luwu Plain, Sulawesi Selatan".

Similar information is not available for the remainder of Luwu but it is likely conditions are similar to those in the North Luwu Plain.

None of the lands are rated as "Very suitable" because of their low organic matter and nutrient content. According to the authors of the Master Plan, high yielding varieties of rice will require applications of nitrogen and phosphate fertilizers. Calcium, magnesium and potassium are supplied in the water. Proper drainage will be required to prevent toxicity (particularly iron toxicity) with double cropping.[1]

3.4.1.2. Land Use

Kabupaten Luwu has an area of 25,144 square kilometers. As its description earlier suggests, it is in large part a mountainous area with a relatively small amount of land in economic production (see table 3.3). Almost 44 percent of the land area is forested. Cropland which includes land devoted to field crops, estate crops and fish ponds comprises about 5 percent of total. About half of the 132 thousand hectares of total cropland is used for rice and field crops. The remainder is devoted to estate crops and fish ponds.

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[1]All of the foregoing information is from the "Master Plan, Irrigation Development for North Luwu Plain, Sulawesi Selatan", Ilaco March 1977, pp. 24-26.

Other land or 1.2 million hectares includes areas about which little is known. Some of it may be wasteland. Almost 8,000 square kilometers or 787 thousand hectares included in other land may have some economic potential.

The Kecamatans of Bastem, Nuha, and Masamba are the largest in terms of area and together contain 35 percent of the land area of Kabupaten Luwu. Kecamatan Wara, in which the administrative center of Palopo is located, along with Kecamatan Suli are the smallest with each comprising less than one percent of the area (see table 3.4).

TABLE 3.3

LAND USE IN KABUPATEN LUWU

	000 Hectares		Percent of Total	
Field cropland		69.5		2.8
Lowland rice	53.4		2.1	
Dry crops	16.1		0.7	
Small plantations (25 ha or less)		41.7		1.7
Large plantations (over 25 ha)		13.4		0.5
Fish ponds		7.8		0.3
Total agricultural land		132.4		5.3
Pasture land		103.6		4.1
Forest land		1,095.7		43.6
Farmersteads/Urban land		22.8		0.9
Other land		1,159.9		46.1
Total other than cropland		2,382.0		94.7
Grand total land		2,514.4		100.0

SOURCE: BAPPEDA, Kabupaten Luwu.

Overall, only a small portion of the land in Kabupaten Luwu is cultivated.[1] The 132,400 hectares cultivated account for only 5.3 percent of the land area.

Walenrang and Bupon led the Kecamatans in 1980 in terms of area cultivated. About 17,000 hectares were tilled in each. Together the two Kecamatans account for a total of 26 percent of land cultivated in the Kabupaten. Kecamatans Bastem, Masamba, Bajo, Larompong, Mangkutana and Limbong are also important with each having about 8-10 percent of the total tilled land in Luwu. Together the eight Kecamatans contain over three-quarters of the land cultivated in Luwu. This information is shown in columns 1 and 2 of table 3.5.

3.5. Agricultural Land.

The southern kecamatans in general have the largest percentage of their area in agricultural use. One-fifth to one-third of the land in the southern Kecamatans of Suli, Larompong, Bupon and Bajo is cultivated. The large Kecamatans, which include much of the mountainous region, have relatively little of their area tilled.

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[1]Data were collected by desa from "Potensi Desa 1980", Kantor Statistik, Kabupaten Luwu. In a few exceptions data were not complete. In these cases another source "Potensi Desa" by Kabupaten Luwu Rural Development Office (BANDES) was used. Field crop data were adjusted to conform to kecamatan totals from the DINAS Pertanian, Palopo.

TABLE 3.4

TOTAL LAND IN KABUPATEN LUWU BY KECAMATAN

	000 Hectares	Percent of Total
Larompong	36.0	1.4
Suli	20.0	0.8
Bajo	59.2	2.4
Bastem	324.9	12.9
Bupon	75.0	3.0
Wara	19.0	0.8
Walenrang	183.2	7.3
Sabbang	241.	9.6
Limbong	244.	9.7
Masamba	274.	10.9
Malangke	80.0	3.2
Bone Bone	63.2	2.5
Wotu	177.3	7.0
Mangkutana	210.4	8.4
Malili	215.5	8.6
Nuha	291.0	11.5
Total	2,514.4	100.0

SOURCE: BAPPEDA, Kabupaten Luwu.

Cropland comprises 69.5 thousand hectares. It can be differentiated from agricultural land by the nature of the use of the land. Cropland is defined as land used for rice, vegetables and crops such as soybeans, maize, cassava, etc. Agricultural land would also include land utilized for fish ponds, estate crops (spices, rubber, coffee, etc.) and fruits.

Cropland is further divided into lowland and upland. Lowland, which is also known as sawah, is used mostly for

TABLE 3.5

AGRICULTURAL LAND IN EACH KECAMATAN AS PERCENTAGES OF TOTAL AGRICULTURAL LAND IN KABUPATEN LUWU AND TOTAL LAND IN THE KECAMATAN

	000 Hectares	Percent of Total Agricultural Land	Percent of Total Land in Kecamatan
Larompong	10.5	8.0	29.2
Suli	6.2	4.7	31.0
Bajo	10.8	8.1	18.2
Bastem	12.9	9.7	4.0
Bupon	16.7	12.6	22.3
Wara	3.0	2.3	15.8
Walenrang	17.3	13.1	9.4
Sabbang	3.9	3.0	1.6
Limbong	9.9	7.4	4.0
Masamba	11.1	8.4	4.0
Malangke	4.5	3.4	5.6
Bone Bone	5.8	4.4	9.2
Wotu	6.0	4.5	3.4
Mangkutana	10.3	7.8	4.9
Malili	2.3	1.7	1.1
Nuha	1.2	0.9	0.4
Total	132.4	100.0	5.3

SOURCE: BAPPEDA, Kabupaten Luwu.

growing rainy season and dry season rice. Dry cropland is used for upland rice, vegetables or field crops such as maize, soybeans, cassava, among others.

The relative importance of each kecamatan to Kabupaten Luwu in terms of cropland is about the same as agricultural land is to total land. There are a few exceptions to this general situation. Kecamatans Mangkutana and Bone Bone are relatively more important in terms of cropland than agricultural land. The opposite is the case for Larompong and Bastem (see table 3.6).

TABLE 3.6

CROPLAND BY KECAMATAN

	000 Hectares			Percent of Total		
	Low Land	Dry Crop Land	Total	Low Land	Dry Crop Land	Total
Larompong	1.4	1.4	2.8	2.6	8.7	4.0
Suli	3.6	0.4	4.0	6.7	2.5	5.7
Bajo	5.8	0.7	6.5	10.9	4.4	9.3
Bastem	1.1	0.2	1.3	2.1	1.2	1.9
Bupon	8.4	0.4	8.8	15.7	2.5	12.7
Wara	0.9	0.1	1.0	1.7	0.6	1.4
Walenrang	11.2	0.6	11.8	21.0	3.7	17.0
Sabbang	3.0	0.1	3.1	5.6	0.6	4.5
Limbong	1.9	1.4	3.3	3.6	8.7	4.7
Masamba	4.8	0.7	5.5	9.0	4.4	7.9
Malangke	1.5	0.6	2.1	2.8	3.7	3.0
Bone Bone	4.0	0.3	4.3	7.5	1.9	6.2
Wotu	1.4	2.4	3.8	2.6	14.9	5.5
Mangkutana	3.4	6.4	9.8	6.4	39.8	14.1
Malili	0.4	0.2	0.6	0.7	1.2	0.9
Nuha	0.6	0.2	0.8	1.1	1.2	1.2
Total	53.4	16.1	69.5	100.0	100.0	100.0

SOURCE: BAPPEDA, Kabupaten Luwu.

Kecamatan Walenrang contains 17 percent of the cropland while Kecamatans Mangkutana and Bupon have 14 and 13 percent respectively.

Quite expectedly, the more mountainous Kecamatans are the ones which are important for estate crops. Kecamatan Bastem alone accounts for 21 percent of the plantation land. Kecamatans Larompong, Bupon, Limbong and Masamba are also important in terms of estate cropland (see table 3.7).

TABLE 3.7

PLANTATION LAND BY KECAMATAN

	000 Hectares			Percent of Total		
	25 or Less Ha	Over 25 Ha	Total	25 or Less Ha	Over 25 Ha	Total
ırompong	6.9	-	6.9	16.5	-	12.5
ılli	1.8	-	1.8	4.3	-	3.3
ıjo	3.6	-	3.6	8.6	-	6.5
ıstem	4.4	7.2	11.6	10.6	53.7	21.0
ıpon	4.9	1.1	6.0	11.8	8.2	10.9
ıra	1.3	0.5	1.8	3.1	3.7	3.3
ılenrang	4.3	0.6	4.9	10.3	4.5	8.9
ıbbang	0.6	0.1	0.7	1.4	0.8	1.3
.mbong	4.7	1.3	6.0	11.3	9.7	10.9
ısamba	4.6	1.0	5.6	11.0	7.5	10.2
ılangke	-	-	-	-	-	-
›ne Bone	0.9	0.6	1.5	2.2	4.5	2.7
›tu	1.8	0.5	2.3	4.3	3.7	4.2
ıngkutana	0.4	-	0.4	1.0	-	0.7
ılili	1.1	0.5	1.6	2.6	3.7	2.9
ıha	0.4	-	0.4	1.0	-	0.7
Total	41.7	13.4	55.1	100.0	100.0	100.0

SOURCE: BAPPEDA, Kabupaten Luwu.

Potential undeveloped economic land which is included in the figure for "Other land" in table 3.3 is quite extensive in the Kabupaten totalling 787 thousand hectares or 31 percent of total land in Luwu. A study should be made of this land to determine the uses to which it could be put as well as to derive firm data concerning existing land use (see table 3.8).

A study of this type might utilize some of the more recent developments in remote sensing techniques. Costs

TABLE 3.8

UNDEVELOPED ECONOMIC LAND BY KECAMATAN

	000 Hectares	Percent of Total
Larompong	16.4	2.1
Suli	3.0	0.4
Bajo	31.2	4.0
Bastem	30.2	3.8
Bupon	24.5	3.1
Wara	3.8	0.5
Walenrang	26.9	3.4
Sabbang	131.6	16.7
Limbong	72.2	9.2
Masamba	72.6	9.2
Malangke	52.7	6.7
Bone Bone	26.6	3.4
Wotu	100.2	12.7
Mangkutana	155.3	19.7
Malili	34.0	4.3
Nuha	5.8	0.8
Total	787.0	100.0

SOURCE: BAPPEDA, Kabupaten Luwu.

could possibly be minimized by confining the surveys to those areas which appear from existing aerial photo and other data to have economic potential.

4. Human Resources

4.1. Population

The population of the Kabupaten was 503,743 in 1980 according to the population census. It is estimated to be 521,500 at end of 1981[1]. Since mid-1980, population has grown at an average annual rate of 2.5 percent per year.

The median age of the population was 16.8 years in 1980. Males are younger than females with a median age of 15.8 years compared to 17.7 for females. There are fewer females than males in the age groups of less than 15 years.

TABLE 4.1

POPULATION OF KABUPATEN LUWU
BY AGE GROUP IN 1980

Age Group	Male Number	Male Percent of Total	Female Number	Female Percent of Total	Total Number	Total Per of
0-4	44,132	17.5	41,760	16.6	85,892	
5-9	44,028	17.5	40,748	16.2	84,776	
10-14	34,440	13.7	30,062	11.9	64,502	
15-24	36,742	14.6	44,514	17.7	81,256	
25-49	68,124	27.0	72,045	28.6	140,169	
Over 50	24,601	9.7	22,547	9.0	47,148	
Total	252,067	100.0	251,676	100.0	503,743	1
Median	15.8		17.7		16.8	

SOURCE: Penduduk Kabupaten Luwu, 1980.

[1]Kantor Statistik, unpublished.

In the groups between 15-49 years of age, females exceed males and overall, the number of males and females is about equal with the male-female ratio being 100.2 to 100.0.

Kecamatan Walenrang is the most populous in the Kabupaten. Kecamatans Walenrang, Wara and Bone Bone together account for 36 percent of the people in Kabupaten Luwu.

TABLE 4.2

POPULATION BY SEX BY KECAMATAN
1980

Kecamatan	Male	Female	Total	Percent of Total
Larompong	10,841	10,542	21,383	4.2
Suli	7,559	8,382	15,941	3.2
Bajo	16,786	18,573	35,359	7.0
Bastem	6,071	6,464	12,535	2.5
Bupon	23,649	24,260	47,909	9.5
Wara	30,220	30,040	60,260	12.0
Walenrang	34,777	34,549	69,326	13.8
Sabbang	14,279	14,643	28,922	5.8
Limbong	5,302	5,407	10,709	2.1
Masamba	12,247	12,961	25,208	5.0
Malangke	8,757	9,078	17,835	3.5
Bone Bone	26,280	25,685	51,965	10.3
Wotu	13,961	12,732	26,693	5.3
Mangkutana	18,679	17,090	35,769	7.1
Malili	7,709	7,398	15,107	3.0
Nuha	14,950	13,872	28,822	5.7
Total	252,067	251,676	503,743	100.0

SOURCE: Penduduk Kabupaten Luwu, 1980.

During the period 1970 to 1980 the fastest growing Kecamatans were the northern ones of Nuha, Mangkutana, Bone Bone and Wotu. Except for Larompong, the southern ones

recorded the least growth in population. Growth rates during the decade are shown in table 4.3.

The Kecamatans vary only a little from the average of 5.4 members per family for the Kabupaten as a whole. The smallest average family size in 1980 was in Larompong with 5.0 members. The largest was in Wara with 6.0. Also shown in table 4.3 are data concerning size of family.

TABLE 4.3

GROWTH RATES FROM 1970 TO 1980
AND SIZE OF FAMILY IN 1980
BY KECAMATAN

Kecamatan	Average Annual Growth in Percent	Size of Family
Larompong	6.7	5.0
Suli	1.8	5.5
Bajo	2.6	5.3
Bastem	1.1	5.2
Bupon	5.5	5.7
Wara	3.0	6.0
Walenrang	2.4	5.3
Sabbang	3.2	5.3
Limbong	2.7	6.0
Masamba	4.6	5.0
Malangke	3.8	5.8
Bone Bone	8.0	5.3
Wotu	7.5	5.3
Mangkutana	10.7	5.2
Malili	5.3	5.5
Nuha	14.8	5.3
Total	4.8	5.4

SOURCES: Penduduk Kabupaten Luwu 1970, 1980.

4.1.1. Population Growth by Industrial Group

Population of the Kabupaten has grown at an average annual rate of 4.8 percent per year during the 1970 to 1980 period. The most significant relative growth in population was associated with the mining industry which increased 17.5 thousand or 29.7 percent per year. Population on estate farms gained 9.6 thousand or 14.9 percent. While food farm population showed only a modest relative growth of 4.0 percent, the actual increase was 122.7 thousand people (see table 4.4).

TABLE 4.4

NUMERICAL AND AVERAGE ANNUAL CHANGE IN POPULATION IN EACH INDUSTRIAL GROUP 1970 TO 1980

Thousands

	Number 1970	Number 1980	Increase	Percent Annual Growth
Food farms	256.3	379.0	122.7	4.0
Estate farms	18.2	42.4	24.2	8.8
Fishing	3.2	12.8	9.6	14.9
Forestry	0.2	1.0	0.8	17.5
Mining	1.4	18.9	17.5	29.7
Other	35.4	49.6	14.2	3.4
Total	314.7	503.7	189.0	4.8

SOURCES: BAPPEDA, Kabupaten Luwu.

4.1.2. Level of Economic Development

Population in agriculture may be considered as one rough measure of development of an area, i.e., the greater

the portion of the population engaged in agriculture, the lower the level of development. Food farm and estate farm agriculture provided support for 84 percent of the population in 1980. The figure of 84 percent in 1980 for the Kabupaten compares with 87 percent 10 years earlier. These figures are distorted somewhat, however, by the growth of the estate farming group. The growth in estate farming could be looked upon as being a measure of development since it represents a movement away from subsistence type farming to export-oriented agriculture in the Luwu area.

TABLE 4.5

POPULATION BY INDUSTRIAL GROUP AS A PERCENTAGE OF TOTAL IN 1970 AND 1980

	1970		1980	
	Number 000	Percent of Total	Number 000	Percent of Total
Food farms	256.3	81.4	379.0	75.2
Estate farms	18.2	5.8	42.4	8.4
Total farm	274.5	87.2	421.4	83.6
Fishing	3.2	1.0	12.8	2.5
Forestry	0.2	0.1	1.0	0.2
Mining	1.4	0.4	18.9	3.8
Other	35.4	11.3	49.6	9.9
Total	314.7	100.0	503.7	100.0

SOURCE: BAPPEDA, Kabupaten Luwu.

Population engaged in food farming agriculture was 75 percent of total in 1980 down from 81 percent in 1970. This is a significant decrease and suggests there has been some

economic development of the Kabupaten. Development was noticeable in the growth of the estate farming, mining and fishing.

The present level of development of Kabupaten Luwu can be put into perspective by comparing the percentage of the population engaged in agriculture with a benchmark. The relative proportion of the population engaged in agriculture is about the same as in the United States in the second quarter of the nineteenth century. From this, it is quite apparent Kabupaten Luwu is at a very low level of development. While it is not necessary that this be proven statistically, comparisons with another area are helpful in understanding the magnitude of the problems to be overcome in the Kabupaten's future development program.

4.1.3. Labor Force

Labor force, according to the Kantor Statistik is the number of persons age 10 or older who are not blind, mentally incapable, etc.[1] Therefore, it approximates the population in these age groups. There were 163,900 males and 168,600 females in the labor force in 1980. During the year ending October 1982, an average of 624 males and 86 females per month were seeking work at the manpower offices.

[1]Kantor Statistik, Kabupaten Luwu, Luwu Dalam Angka, 1980, September 1981, p. 30.

TABLE 4.6

LABOR FORCE 1980

Age	Men 000	Women 000	Total 000
10-14	34.4	29.6	64.0
15-24	36.8	44.4	81.2
25-49	68.1	72.1	140.2
50 and over	24.6	22.5	47.1
Total	163.9	168.6	332.5

SOURCE: Kantor Statistik, Kabupaten Luwu.

Unemployment must be of modest proportions or else people are unaware of the manpower offices' functions.

4.1.4. Transmigrants

During the period 1970 to 1981, 9,045 families representing 42,744 persons arrived in Luwu from other islands. Nearly half came from Java; one-third from Bali; and one-fifth from the other islands. These migrants and their descendents in 1981 are estimated to comprise 9 percent of the population of the Kabupaten. Place of previous residence of the transmigrants and dates of arrival are shown in tables 4.7 and 4.8[1]

[1] Ibid., pp. 31-32.

TABLE 4.7

NUMBER OF FAMILIES AND POPULATION OF TRANSMIGRANTS AT TIME OF ARRIVAL BY SOURCE TO APRIL 1981

Source	Families	Percent of Total	Present Population	Percent of Total
West Java	407	4.5	1,839	4.3
Jakarta	400	4.4	1,535	3.6
Central Java	1,201	13.3	6,147	14.4
Jogyakarta	172	1.9	707	1.7
East Java	2,118	23.4	9,463	22.1
Total Java	4,298	47.5	19,691	46.1
Bali	3,047	33.7	15,266	35.7
Other islands	1,700	18.8	7,787	18.2
Total arriving	9,045	100.0	42,744	100.0
Total arriving plus descendents	10,149	-	48,593	-

SOURCE: Kantor Statistik, Kabupaten Luwu.

TABLE 4.8

DATE OF ARRIVAL OF TRANSMIGRANTS AND PRESENT POPULATION OF ARRIVING FAMILIES

	Families	Present Population
1970	500	2,741
1971	450	3,050
1971/1972	250	1,464
1972	300	1,614
1973/1974	2,244	12,251
1974	561	3,755
1974/1975	300	2,450
1975	539	2,809
1975/1976	501	1,565
1977	1,000	5,545
1978	850	4,306
1978/1979	350	1,727
1979	500	2,272
1981	700	3,044
Total	9,045	48,593

SOURCE: Kantor Statistik, Kabupaten Luwu.

4.1.5. Educational Status

At the time of the census in 1980, 81 percent of the children aged 7 to 12 years were attending school, 14 percent had not attended school; and 5 percent had attended school but were not enrolled at the time of the census. Thus, at least 86 percent of the children in the Kabupaten are receiving some education.

TABLE 4.9

EDUCATIONAL STATUS OF POPULATION AGES 7 TO 12 YEARS IN 1980

	Number	Percent of Total
No schooling	13,783	14.2
Students	78,329	80.8
Out-of-school	4,869	5.0
Total	96,981	100.0

SOURCE: Penduduk Kabupaten Luwu, 1980.

The Kecamatans with the greatest portion of their children in school were Nuha, Wara, Suli, Masamba, and Mangkutana. Kecamatans Bajo, Bone Bone, Bastem and Wotu had the fewest relative number of children in school.

5. The Productive Sectors

5.1. Forestry Resources and Products

5.1.1. Timber Resources

The Department of Forestry has delineated forested areas which should be preserved either as reserves or to protect watersheds, areas to be exploited to varying degrees, and land which can be cleared. This information, which has not been publicly released, indicates that 247.8 thousand hectares can be cleared for other uses and 629.5 thousand hectares can be exploited to varying degrees (see table 5.1).

There is a conflict between this information and the data provided in table 3.3 which is from another source. This illustrates the need for a study to determine the land uses of the Kabupaten.

TABLE 5.1

TYPES OF FORESTS BY SIZE

	000 Hectares	Percent of Total
Forest preserves/parks	137.2	7.4
Protected forests -- watersheds	837.2	45.2
Limited production forests	573.5	31.0
Regular production forests	56.0	3.0
Forestland which can be cleared	247.8	13.4
Total forest	1,851.7	100.0

SOURCE: Areas were measured from a map provided by Dinas Kehutanan, Palopo.

5.1.2. Tree Farming

The government opened three tree farms in 1978-1979. All were small and their area totalled 150 hectares. None are in operation at the present time.

5.1.3. Lumber and Wood Products Industry

Timber is harvested by individuals and companies having concessions in certain locations. Individuals provide the lumber required for local building and firewood. They also cut rattan and gather resin. Both are sold to local firms for export. Shown in table 5.2 are the estimated amounts harvested during the past three years.

TABLE 5.2

TIMBER HARVEST IN KABUPATEN LUWU BY YEAR

	1976/77	1977/78	1978/79	1979/80
Mixed forest woods in 000 cubic meter	45.8	49.2	31.7	16.6
Ebony in 000 cubic meters	1.2	0.4	2.2	5.2
Firewood in 000 cubic meters	0.9	1.0	0.8	0.5
Rattan in 000 metric tons	1.4	2.3	2.4	3.0
Mangrove in 000 cubic meters	0.1	0.1	4.0	2.2
Resin in metric tons	0.5	0.3	0.4	0.4

SOURCE: Dinas Kehutanan Dati I, Sulawesi Selatan.

Private companies can receive concessions to exploit timber resources in non-reserve areas. Two concessionaires

operate at present in Luwu. Their combined area of operation amounts to 172,500 hectares. In 1981-82, the two companies together employed 152 personnel in all activities including logging and sawmill operations.

Prior to 1980, 95 percent of the timber harvested coul be exported as logs. A letter of decree from the Ministrie of Agriculture, Industry and Commerce issued in June 1980, reguires a permit to exploit timber resources. The decree specified certain conditions of harvest including restrictions on export of logs and size of trees which can be harvested. Softwood trees of less than 50 centimeters in diameter cannot be cut down. The limitation for hardwood trees is less than 60 centimeters in diameter. Certain other trees cannot be harvested. Export of logs will cease completely in 1985.

The markets for sawn lumber and logs (if any) are Japan, Korea and Taiwan. They are hauled by truck to Wotu or Palopo for shipment.

Mangrove, pine and a variety of acacia are used for pulp at the paper mill in Kabupaten Goa. Cutting mangrove exacerbated erosion along stream banks. It is now prohibited except in those areas where a fish pond is planned.

Total value of production of all types of lumber and logs in 1980 is estimated to be Rp. 12 million.[1]

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[1]BAPPEDA, Kabupaten Luwu, unpublished.

Sawmills operating in Kabupaten Luwu in 1981-1982 numbered 54. The capacity represented by these sawmills totalled 248,300 cubic meters per year. Actual production was 198,396 cubic meters in 1981-1982 or 80 percent of capacity.

The largest number (32) was located in Kecamatan Wara. Six were in Kecamatan Wotu. The others were scattered among 11 other Kecamatans (see table 5.3).

Fifteen of the 54 sawing operations were mechanized sawmills. The 15 accounted for 27 percent of the capacity and 28 percent of production. As is apparent from these figures, the capacity and production of the mechanized operations are about the same as for those which are not.

The figures shown in table 5.3 represent a minimum in terms of organizations harvesting wood products. The Camat of Mangkutana, for example, stated there were about 100 hand operated sawmills in his area in October 1982.[1]

Little is known about actual timber resources other than the number of hectares occupied by forests. This is rather extensive and it seems probable that the wood products industry could become quite significant on a localized basis.

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[1]Interview November 9, 1982.

TABLE 5.3

LOCATIONS OF SAWMILLS

Larompong	1
Suli	-
Bajo	1
Bastem	-
Bupon	3
Wara	32
Walenrang	4
Sabbang	1
Limbong	-
Masamba/Bone Bone	2
Malangke	2
Wotu	6
Mangkutana	-
Malili/Nuha	2
Total	54

SOURCE: Kantor Departemen Perindustrian, Palopo.

5.2. Mineral Resources and Mining

Mineral exploration surveys have been made throughout Kabupaten Luwu. In general they have revealed that the mineral deposits are quite minor and mining operations will be small. Exceptions are the nickel deposits in the northern part of the Kabupaten and the copper lead/zinc deposits at Rantepangli which is on the Kabupaten Tana Toraja border with about 60 percent being in Luwu. About 15,000 meters of test boring have been completed the past five years to determine the extent of the copper deposits. From this, it is believed that they do not warrant mining

operations at this time.[1] Locations of other mineral deposits are shown in table 5.4.

TABLE 5.4

MINERAL DEPOSITS IN KABUPATEN LUWU

Coal	Leboni/Masamba (River Mambilo), no exploration
Gold	East of Malili as "placer" sediment
Iron	Larona and 9 other locations - deposits are 500,000,000 tons as clay and 15,000,000 tons as lump ore
Nickel	Soroako P.T. INCO started production in 1975- exports are to foreign countries
Chromite	West of Malili - known, exploration in 1980
Quartz Sand	North of Palopo
Copper	Exploration in Kabupaten Tana Toraja in Sangkaropi - Rantepangli, (Tana Toraja)

SOURCE: Kantor Wilayah Departemen Pertambangan Dan Energi Propinsi, Sulawesi Selatan.

5.2.1. Mining

Nickel deposits near Soroako in Kecamatan Nuha are now being exploited by an international company. The facility includes an open pit mine; an ore processing plant; and ancillary facilities such as 251 megawatts of electric power generation capacity, port facilities at Malili and transport equipment. The ore, when exported, is 75 percent pure.

[1]Statement of Ir. Bachsan Nasution, Kantor Wilayah Departemen Pertambangan Dan Energi Propinsi, Sulawesi Selatan.

The mining operation was begun in 1975. Shipments for 1977 through 1981 had a value of U.S. $333 million (Rp. 216 billion). This is shown in the following table.

TABLE 5.5

PRODUCTION AND SHIPMENTS OF NICKEL FROM MALILI IN TONS

Year	Production	Exports	Value of US $ (Million)	Exports Rupiah[1] (Billion)
1977	2,079			
1978	5,729	5,198	19.53	12.69
1979	11,198	7,921	46.83	30.44
1980	25,944	21,159	144.01	93.60
1981	19,730	18,636	122.79	79.81
1982 (First half)		7,498		

SOURCE: P.T. INCO, unpublished data.

[1]Exchange rate used is Rp. 650 = US $1.00.

From the information in table 5.5, it is apparent that production has been reduced in 1981 and the first six months of 1982 from the peak in 1980. The easing of prices results from the recession and the effects of reduced demand for metal products.

1978	US $3,757 per ton
1979	US $5,912 per ton
1980	US $6,806 per ton
1981	US $6,589 per ton

Total employment in April 1982, including workers of contractors was 4,090 Indonesian nationals and 249 expatriates.

5.3. Fish Resources and Fishing Industry

5.3.1. Fish Resources

There are five sources of fish in Kabupaten Luwu. These are fish ponds, rice fields, brackish water, the rivers and the sea. While the extent of the areas of these is known, little information is available concerning the potential fish resources from them.

According to local sources there has been no apparent diminution in the fish resources in the Bay of Bone.[1] Studies are now underway, however, to determine the potential yield of shrimp from the Bay. This is being carried out as a joint effort of the fishing organization of the Central, Provincial and Kabupaten Governments. Similar surveys are contemplated to determine tuna and baronang resources as well as the potential output of the fish pond and brackish water fish sources. These will be undertaken in 1982-1983. The results of these surveys will assist in the determination of government policy concerning the fishing industry.

5.3.2. Exploitation of Fishing Resources

The fish harvest in 1981 in Kabupaten Luwu totalled 18.6 thousand tons the same as in 1980. The catch from

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[1] All data concerning the fishing industry are from Dinas Perikanan Kabupaten, Palopo.

the Bay of Bone was off from the previous year in 1981. This was offset by an increase in harvest from fish farms. Data previous to 1980 appear to be unrealistic so long-term trends in the harvest cannot be evaluated.
Total fish production in 1980 was valued at Rp. 5.9 million.[1]

As one would expect, the bulk or 75 percent of the tonnage caught is salt water fish from the Bay of Bone. Fish raised in conjunction with paddy and in brackish water areas are of the next order in importance representing 10 percent and 8 percent of total respectively. Fish ponds were the source of only 4 percent of total fish.

Wara's harvest from the Bay accounts for almost half of the total from that source. Other important Kecamatans in terms of tonnage of fish caught from the Bay are Malili, Larompong, Wotu and Bupon. These Kecamatans have the requisities for a primitive sea fishing industry, i.e., harbor and market.

The market for the fish in excess of local needs from the southern Kecamatans of Larompong and Suli is Kabupaten Wajo to the South. The northern Kecamatans of Wotu, Bone Bone and Malili have an additional market in the Soroako

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[1]BAPPEDA, Kabupaten Luwu, unpublished.

TABLE 5.6

FISH HARVEST IN 1980 AND 1981
BY SOURCE
000 TONS

	1980	1981	Percent Change	Percent of Total 1981
Fish culture				
Fish ponds	0.4	0.8	100.0	4
Rice fields	0.8	1.8	125.0	10
Brackish	0.9	1.5	66.7	8
Total	2.1	4.1	95.2	22
Fish catch				
Swamps	0.2	0.2	0.0	1
Rivers	0.3	0.3	0.0	2
Lakes	-	-	-	-
Sea	16.0	14.0	-12.5	75
Total	16.5	14.5	-12.1	78
Grand total	18.6	18.6	0.0	100

SOURCE: Dinas Perikanan Kabupaten, Palopo.

mining population. Bupon and Bajo market in Wara while Malangke markets in both Soroako and Wara. Some fish is also exported from Wara to Kabupaten Tana Toraja and to Soroako.

As is indicated below exports from Wara are quite small relative to catch. The same can no doubt be assumed for the other Kecamatans.

	Fish and Shrimp Tons Exported
1977	37
1978	38
1979	89
1980	61
1981	76

TABLE 5.7

SOURCE OF FISH BY KECAMATAN IN 1981
IN TONS AND INDICATED PER CAPITA
CONSUMPTION PER DAY

	Fish Pond	Rice Fields	Brackish Water	Swamp	River	Sea	Total	Kg/Cap Day
Larompong	-	-	108.9		8.1	1,143.2	1,260.2	.16
Suli	-	-	118.1		9.4	896.9	1,024.4	.18
Bajo	12.8	301.8	168.2		11.0	698.6	1,192.4	.09
Bastem	-	-	-		-	-	-	-
Bupon	54.5	63.1	270.3		26.8	1,065.7	1,480.4	.08
Wara	11.7	136.7	78.5		23.6	6,763.5	7,014.0	.32
Walenrang	220.4	286.0	181.1	184.4	56.9	-	928.8	.04
Sabbang	261.0	576.6	-	3.6	39.0	-	880.2	.08
Limbong	-	-	-	-	-	-	-	-
Masamba	150.2	160.4	-	4.4	20.5	-	335.5	.04
Malangke	-	-	425.8	10.6	50.0	887.8	1,374.2	.21
Bone Bone	116.9	103.4	39.3	11.1	20.9	384.5	676.1	.04
Wotu	-	-	47.8	-	-	1,005.4	1,053.2	.11
Mangkutana	-	206.7	-	14.0	10.6	-	231.3	.02
Malili	1.8	-	23.0	-	-	1,184.1	1,208.9	.22
Nuha	1.6	-	-	-	-	-	1.6	a
Total	830.9	1,834.7	1,461.0	228.1	276.8	14,029.7	18 1.2	.10

SOURCE: Dinas Perikanan Kabupaten, Palopo.
a less than .005 kilograms.

Exports of fish must be licensed by the Dinas Perikanan Kabupaten which is the source of the foregoing data.

5.3.3. Marketing

Marketing arrangements are primitive. There is usually a middleman who purchases fish from the fisherman. Reportedly these people, who number 20 at Palopo, act as moneylenders to the fisherman. Thus they can exercise leverage on the fisherman in terms of a lower purchase price for the catch.

The Fisheries Department maintains a cold storage facility (which also sells ice) at Palopo for use by fishermen who, because of price considerations, may wish to hold one day's catch for later sale and for middlemen who are assembling fish to fill an order for Soroako or occasionally Ujung Pandang. This facility of 5 tons capacity usually operates only during July through October which is the best fishing season. The facility will have to be improved and expanded if the fish harvest increases. If operable, the storage facilities are adequate at present as shown by the following data.

	Tons Stored	
	Fish	Shrimp
1977	13	10
1978	21	17
1979	15	16
1980	16	8
1981	3	-

The decreased requirement for storage in 1980 and 1981 is reported to stem from a reduction in demand at Soroako.

The fishermen have no other occupation and try to catch as many fish as possible. If the price is low, they try to catch more in order to enhance their income.

5.3.4. Development Program

The harvest is poor, being only 1.4 tons per fisherman in 1981. It was the objective of the Fisheries Department to increase this to 2.0 tons in 1983-1984 but the program has been delayed and the target is unlikely to be met.

The government program to increase production consists of extending credit to buy equipment, providing training and making improvements in marketing. All of these are being done through cooperatives which are being established with governmental guidance. The program began in February 1982.

Under the program, members of the cooperative can secure credit of Rp. 1.5 million to Rp. 2.5 million to purchase equipment. They must take a training course of one week on its use as a condition of the loan. As of May 15, 1982, 343 fishermen from the Kabupaten had received credit or were in process of getting it. This represented loans totalling Rp. 409 million.

At the government's encouragement, a marketing cooperative was started in the spring of 1982. It is too early to determine the effects of this activity on price.

The Fisheries Department also assists in fish farming. It has hatcheries at Kecamatans Mangkutana, Bone Bone, Wara, Bajo and three in Walenrang. Operators can purchase fry at subsidized prices. Plans are in process for training programs and for expansion of fish ponds in Walenrang.

As part of its fishing program the government maintains some controls over the industry. Licenses are required when certain types of equipment are used. It has been the practice not to issue licenses to fishermen who use trawls.

5.3.5. Dietary Aspects of Fishing Industry

Fish is a significant source of protein in the diet of the population of Kabupaten Luwu. Shown also in table 5.7 is the 1981 fish harvest in each Kecamatan on a per capita per day basis.

Overall, it appears that the population consumes about one-tenth of a kilogram a day per person on the average. Some Kecamatans such as Wara, Larompong, Suli, Mangkutana and Malili have totals much higher than this. These are the areas where significant amounts of fish from the Bay of Bone are caught.

5.4. Agriculture

The economy of Kabupaten Luwu is based on the agricultural sector. As indicated in section 4.1 three-quarters of the population derive their livelihood from food farms. An additional 8 percent is engaged in raising estate

crops such as coffee, clove, or pepper. Total population directly engaged in agricuture amounted to 421 thousand in 1980 or over 84 percent of total.

Agriculture in Luwu is oriented toward production of rice, the staple food of the area. While estate crops, field crops, fruits and vegetables are grown as well, most of the income is derived from the rice crop.

Agriculture in Kabupaten Luwu is important to South Sulawesi and to Indonesia. Hectares of rice harvested in Kabupaten Luwu, for example, comprised 11 percent of total in South Sulawesi in 1981 and production of rice was 9 percent of total for the Province.

5.4.1. Tenure

Relatively few of the farmers are tenants. Farmers who own the land they till comprise 84 percent of total while less than 10 percent are tenants. The remainder own part of their land and rent the rest. Tenants usually sharecrop the land.

Nearly 60 percent of the farms are in excess of 0.5 hectares. The average size of farm in the North Luwu Plain was 1.1 hectares in 1976.[1]

Fragmentation is not as much of a problem as in some areas, but exists to some degree. A study in 1975 in

[1]Ilaco "Master Plan, Irrigation Development for the North Luwu Plain, Sulawesi Selatan, March 1977."

selected areas of North Luwu indicated that each sample farmer on the average tilled 2.6 land fragments of 0.46 hectares in size.[1] Farmers' rice land plots were an average of 0.6 kilometers, 1.1 kilometers and 1.4 kilometers from their homes in Bone Bone, Lamasi and Kalaena respectively.[2] This illustrates the significance of fragmentation on the efficient utilization of the cultivators' time.

Fragmentation of land usually arises as a result of inheritance practices. It becomes an economic problem because, with a number of plots in a farm, the cultivator is required to spend relatively more of his time going from one plot to another or from the farmstead to each plot.

5.4.2. Mechanization And Labor

5.4.2.1. Mechanization

Traditional methods of tillage and cultivation using buffalo or oxen are generally employed. Traditional tools are used. According to a study in 1975, farmers' investment in tools amounted to only 1-5 percent of total farm investment.[3] Sprayers were available on loan from Dinas,

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[1]Institute Pertanian Bogor," North Luwu Microeconomic Study, Volume I", February 1976, pp. 111-24, 25.
[2]Ibid., p. VI-5.
[3]Ibid., pp. II-12 to III-18.

cooperatives and other government organizations. In some areas small tractors were available.

Conditions have not changed markedly since the time of this study. Although relatively few are being used now, tractors are being introduced rapidly. In October 1982, there were a total of 213 tractors in the Kabupaten of which 13 were hand tractors. Maintenance is a severe problem and almost one-fifth were inoperative.

It does not seem to make much difference whether the tractors are owned by farmers or by rental companies, the same portion were inoperative at the time this information was developed by Camat office interviews.

Despite the increase in hectares farmed, draft animals, particularly in South Luwu, are decreasing. Seven Camats reported that the number of draft animals was decreasing in their areas. In those areas where the number of draft animals is decreasing, it is because land previously used as pasture is being devoted to use for estate crops.

Very few rice threshers are used at present. Introduction of these could result in considerable increase in return to farmers. It has been estimated that rice harvesting losses might be as high as 20 percent at present. This could be reduced to perhaps 12 percent with improved harvesters. Combines are the ultimate answer to the problem. Use of stationary mechanical harvesters, however, would improve the situation considerably at present.

5.4.2.2. Labor

According to a time study of samples of cultivators in the Lamasi, Bone Bone and Kalaena areas in 1975, farmers, on the average, worked 106 days per family labor force per year. A workday represents 6 hours in two shifts. Farm families in Kalaena were the busiest working 187 man-days per year while those in Lamasi worked 111 man-days and Bone Bone 85 man-days. The labor was seasonal with February being the peak month with 14 work days. With the increase in the provision of irrigation and the possibility of growing a second crop, these figures have changed in some areas by this time.

The survey also found that farmers engaged in outside income producing work as well as in activities to help each other. On average, the number of days each year devoted to earning extra income was 52 in 1975.[1]

Despite the apparent excess of farm labor at that time, nearly all the Camats reported there was insufficient farm labor now. Farm labor is in short supply, they said, because the young people are migrating to other areas. Thus the farm population is getting old and the work capacity of the farm labor force is decreased.

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[1] Ibid., pp. II-12 to III-18.

Camats were asked what portion of the youth was leaving. Answers varied but it appears from their responses that 20-25 percent are. While this type of survey is very unscientific, it seems likely a sizeable percentage of youth migrate after leaving school. With education becoming more easily obtainable, the tendency for youth to leave can be expected to continue.

The educational development program has the effect of encouraging the youth of the population to leave Luwu and affects agriculture. Another side effect is that school occupies their time when before they were employed on the farm. This also diminishes the effective agricultural labor force.

An interview with the contractor constructing irrigation works in Kecamatan Mangkutana indicates that labor supply is adequate except in the peak farming season. On the other hand, the contractor states that labor is also secured from Kabupaten Tana Toraja. Labor from Toraja is paid Rp. 1,700 per day while local labor is paid Rp. 1,200 per day. It seems unlikely that labor would be imported at a higher price if it were available locally. Thus it must be assumed that local labor is now scare.

This means that the matter of introducing farm equipment will have to be addressed. There already has been some action taken in this direction. FCC's are beginning to

provide tractor rental services as indicated in section 10.4.6. This seems to be the most reasonable approach to overcoming the shortage of draft anamials and labor in the near term. Some method must be found, however, to overcome the maintenance problem of mechanized farm equipment if agriculture is to expand the way it could.

It seems probable that sufficient labor will be available for expansion of agriculture and the development of some industry. The problem will be to introduce methods of farming that free some farm labor as well as to encourage the population on the land to engage in agricultural or other activities required to develop the area economically.

5.4.3. Markets

Most of the excess paddy is marketed through the farm cooperatives (KUD's). These in turn sell it to DOLOG. Some of the farmers sell to buyers in the private sector.

There are some seasonal fluctuations in the price of rice. March and April are usually the months of the peak while the low is in May and June. A more detailed discussion of some of the marketing problems is found in section 10.4.2.

Estate crops and the field crops such as maize, cassava and soybeans are sold to buyers in the private sector.

5.4.4. Potential Agricultural Expansion

The absence of surveys precludes the determination of the potential expansion of agricultural production laterally in Luwu. Undeveloped land with economic potential has been estimated to be 787 thousand hectares. The amount varies from 3 thousand hectares in Kecamatan Suli to 155 thousand hectares in Kecamatan Mangkutana. Overall this represents almost one-third of the total land area in the Kabupaten.

Much of the land is no doubt marginal and of limited agricultural use. That there is considerable scope for expansion of agricultural land given the proper infrastructure, however, seems to be a reasonable conclusion. A table which shows potential economic land by Kecamatan is provided in section 3.4.1.2.

5.4.5. Cropping Patterns

There is little information available concerning actual cropping patterns. Data are available concerning crops planted and are provided in that section of this report. Information concerning how crops are rotated on a given field, however, are not available in a statistical sense.

Based upon observation and conversations with local officials, farmers generally do not grow crops other than rice on sawah. Other land than sawah including upland fields is used for ladang or upland rice, vegetables, and

field crops such as soybeans, maize and peanuts. Presumably there has been sufficient land available to permit these rather land extensive methods of agriculture to develop.

The implications of continuing this practice are significant. First, full benefits may not be secured from the irrigation systems being provided by government. This is because there may not be sufficient water in some areas to grow a second or third crop of rice. If other crops with lower water consumption are not grown, the land will remain fallow during part of the year when it could be made productive.

In addition, other crops could be beneficial to the soil. Legumes such as soybeans add nitrogen to the soil. Their growth would improve the soil as well as provide an important food or cash crop.

At the present time the Maros Institute for Food Crops (Balai Penelitian Tanaman Pangan) is conducting agricultural research in Kecamatans Bone Bone and Wotu on 70 plots under contract with Project Luwu. As part of this research program, the adaptability of various crops other than rice to sawah is being studied. Crops included in the program are soybeans, peanuts, cabbage, maize, sweet potatoes and cassava, among others. Results of these studies are not yet available but should be forthcoming within the next year. They can provide an important source of guidance for development planning.

A more important aspect of the expansion of vegetable and especially field crop production is the education of the cultivators to grow them. Along with the educational process, ways must be found to make adequate supplies of seeds accessible to them, make other inputs available, and to develop marketing arrangements for their production.

As part of the first of these efforts, the FCC's in 1982-1983 have an experimental program to lend money to cultivators for the necessary inputs and will guarantee a market for the production of maize, soybeans or beans grown on 35 hectares in Karambua II. The REC will provide training to the farmers on intercropping, i.e., growing two types of crops simultaneously on the same plot.

5.4.6. Irrigation

A surprising portion of the lowland area is under irrigation. Overall 75 percent of the lowland arable area was reported in 1980 to be irrigated.[1] Practically all of this is "village" irrigation or by systems developed over the years by the farmers themselves. These systems provide irrigation for 36,867 hectares or 69 percent of the lowland area.

According to a survey of each desa, 15 percent of the facilities in the village irrigation were reported to be in poor condition. Additionally almost all of the Camats

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[1] BAPPEDA, Kabupaten Luwu, unpublished.

characterized the village irrigation systems as being in "poor" condition.

Semi-technical irrigation and technical systems provid irrigation for an additional 3,478 hectares or 6 percent of the sawah area. Both of these are engineered systems.

Under semi-technical irrigation the water to each farmer is controlled in terms of quantity. Under the technical irrigation system, time of each farmer's use as well as quantity are controlled. The advantage to the latter is that more land can be irrigated with a given quantity of water. The disadvantage is that it requires a discipline on the part of the users which is sometimes lacking.

In those areas where relatively large quantities of water are available, it is better and less expensive in terms of time to use the semi-technical approach. There are few instances where ample water supplies are available relative to potential irrigated land. It appears that Kabupaten Luwu is an area where water is not available in the quantities that would make semi-technical irrigation the desired system. The only Kecamatans with technical or semi-technical systems are Bone Bone and Mangkutana (see table 5.8).

Irrigation is desirable in rice cultivation to ensure that moisture is available when needed during the rainy

season crop. As noted in the section on climate, rainfall in Kabupaten Luwu is erratic and not only varies considerably from year-to-year but also tends to be characterized by local storms. Thus supplemental moisture or irrigation may be needed to prevent crop damage or crop failure. The need for irrigation is greater during the dry season when rainfall is somewhat more erratic. The availability of irrigation does not necessarily mean that farmers will utilize it. This is because irrigation increases the work involved in farming and farmers may not grow a second crop of rice unless there is a pressing need to do so. The measure of the extent to which farmers grow another crop or even utilize the available developed land for crops is termed cropping intensity and is discussed in the next section.

Semi-technical and technical irrigation systems are designed and constructed by Direktorat Irrigasi, Departemen Pekerjaan Umum. This organization has significant projects underway in the North Luwu Plain. These projects are discussed in some detail in section 10.2.

Another organization, Pekerjaan Umum Seksi Pengairan has the role of designing and supervising construction of smaller complicated irrigation schemes. Its budget has been insufficient in recent years to carry out this activity. Projects undertaken by the organization number 7 and cover 12,600 hectares of land.

The least complicated projects are financed under the Provincial budget and are carried out by the farmers themselves.

According to the Camats, irrigation is the greatest need of the farmers. Small schemes such as the ones mentioned above probably represent a better return on capital invested than big ones. If water is unavailable and has to be imported, there is no alternative to undertaking large projects such as those in North Luwu if irrigation is to be provided.

In the meantime, attention to the existing village irrigation works with the objective of improving the physical works, management, and maintenance would seem to be a reasonable first step in providing irrigation to the farmers of Kabupaten Luwu.

The Provincial Public Works Department is responsible for operation and maintenance of technical and semi-technical irrigation systems. A tax on water users will cover the cost of this. Insofar as it is known, this tax is not being collected at present.

5.4.7. Cropping Intensity

Cropping intensity provides a measure of the extent to which farmers use irrigation and/or other techniques required to produce more than one crop per year. It is calculated by dividing the actual hectares planted by the

TABLE 5.8

HECTARES IRRIGATED BY TYPE OF IRRIGATION SYSTEM
AND BY KECAMATAN IN 1980

	Hectares					Percent of Total				
	Technical Irrigation	Semi-Technical Irrigation	Village Irrigation	Not Irrigated	Total	Technical Irrigation	Semi-Technical Irrigation	Village Irrigation	Not Irrigated	Total
Larompong	-	-	1,300	102	1,402	-	-	93	7	100
Suli	-	-	3,545	50	3,595	-	-	99	1	100
Bajo	-	-	5,400	450	5,850	-	-	92	8	100
Bastem	-	-	850	200	1,050	-	-	81	19	100
Bupon	-	-	5,398	3,003	8,401	-	-	64	36	100
Wara	-	-	897	-	897	-	-	100	-	100
Walenrang	-	-	8,307	2,917	11,224	-	-	74	26	100
Sabbang	-	-	2,000	995	2,995	-	-	67	33	100
Limbong	-	-	1,928	-	1,928	-	-	100	-	100
Masamba	-	-	4,079	675	4,754	-	-	86	14	100
Malangke	-	-	853	647	1,500	-	-	57	43	100
Bone Bone	1,152	212	917	1,707	3,988	29	5	23	43	100
Wotu	-	-	778	590	1,368	-	-	57	43	100
Mangkutana	2,114	-	125	1,209	3,448	61	-	4	35	100
Malili	-	-	-	450	450	-	-	-	100	100
Nuha	-	-	490	96	586	-	-	84	16	100
Total	3,266	212	36,867	13,091	53,436	6	a	69	25	100

SOURCE: BAPPEDA, Kabupaten Luwu.
a Less than 0.5 percent.

hectares available for cultivation. Estate crops and fruits represent crops of a perennial nature and occupy the land the entire year. Thus the hectares planted considered in calculating cropping intensity comprise only those devoted to rice, field crops such as maize and soybeans, and vegetables.

Overall the cropping intensity was 129 and varies from a low of 69 in Kecamatan Bupon to a high of 228 in Kecamatan Bone Bone. Seven of the Kecamatans had cropping intensities of less than 100 indicating that farmers did not utilize all of the developed land available to them in those areas. These tended to be grouped in the southern portion of the Kabupaten with four of the Kecamatans with low cropping intensities being in this area.[1]

The data concerning hectares of vegetables and field crops planted are misleading. In some areas the farmers plant two crops of vegetables in the same plot at the same time. In fact, this practice is encouraged by the advisors from the Rural Extension Centers. As a result, agricultural statistics include these plots twice, once for each type of crop. This results in the cropping intensity data being

[1] All the data concerning hectares planted and harvested as well as agricultural production are from unpublished data from Dinas Pertanian in Palopo and Ujung Pandang.

distorted. Therefore it is more meaningful to consider cropping intensity for sawah land only.

The cropping intensity for sawah land only was 106 in 1980. Cropping intensity here is determined by comparing the combined total of hectares of rendengan and gadu planted in each Kecamatan with hectares of developed sawah available to farmers there. The cropping intensity is highest in Kecamatan Bone Bone with 163 and lowest in Kecamatan Nuha with 52.

None of the Kecamatans have high cropping intensities as measured by standards in some other countries. Since, with irrigation it is theoretically possible to grow three crops of rice, a cropping intensity of over 200 seems reasonable for sawah in some Kecamatans. A cropping intensity such as 84 in Kecamatan Mangkutana where 61 percent of the sawah land is under technical irrigation doesn't seem reasonable.

It may be, however, that what is described as irrigated is not actually under irrigation since there has been a delay in completion of the tertiary irrigation system in this Kecamatan[1]. Nonetheless, the same anomaly exists in

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[1]The Camat, Kecamatan Mangkutana, stated in an interview, November 9, 1982, that some of the land brought under irrigation was owned by absentee landholders. Therefore the irrigation system was not being fully utilized. Other problems also exist (see section 10.2.6-5g).

some other Kecamatans. This is illustrated in table 5.9 in which is shown a comparison of sawah cropping intensity in 1980 and the combined percentage of land under technical, semi-technical and village irrigation.

An inspection of the data concerning sawah cropping intensity and percentage of sawah irrigated suggests the relationship between the two variables is not as great as would be supposed. This is confirmed by regression analysis which results in a coefficient of determination of .42 for the relationship between sawah cropping intensity and percentage of sawah irrigated by Kecamatan. This shows that 42 percent of the variation in cropping intensity among the Kecamatans can be attributed to variations in percentage of sawah under irrigation. This indicated relationship is not as high as would be expected. Therefore, the data themselves must be examined to determine if there are reasons for this lower than expected degree of correlation.

The data concerning the amount of land irrigated in 1980 are believed to be fairly accurate. They were gathered by physically reviewing the sawah areas throughout Kabupaten Luwu. It is true, of course, that some the irrigation systems, particularly the village systems, may not be operating, or not operating effectively. In addition, the village systems generally utilize smaller streams which may not be able to support a dry season paddy crop.

TABLE 5.9

SAWAH CROPPING INTENSITIES COMPARED TO PERCENTAGE OF SAWAH UNDER TECHNICAL, SEMI-TECHNICAL AND VILLAGE IRRIGATION IN 1980

	Sawah Cropping Intensity	Percentage of Land Under Irrigation
Larompong	135	93
Suli	86	99
Bajo	97	92
Bastem	95	81
Bupon	117	64
Wara	56	100
Walenrang	126	74
Sabbang	84	67
Limbong	113	100
Masamba	83	86
Malangke	93	57
Bone Bone	163	57
Wotu	84	57
Mangkutana	64	65
Malili	104	-
Nuha	52	84
Total	106[a]	69

SOURCE: Derived from data from BAPPEDA Kabupaten Luwu, and Dinas Pertanian, Palopo.
a weighted average cropping intensity.

Cropping intensities on sawah in 1981 show a better, but not striking correlation to estimated percentage of land under irrigation. Using 1980 data concerning irrigation and developed sawah, cropping intensities were calculated using 1981 crop data. Kecamatan Bone Bone not only had the highest cropping intensity, it increased from 1980 to 1981. This must reflect the effort being made in this area to provide technical irrigation and to educate farmers concerning how to use it to best advantage (see table 5.10).

The benefits of engineered irrigation are evidenced when multiple regression analysis is used to determine the relationship between the percentage of land under irrigation and the cropping intensity. With technical, semi-technical and village irrigation treated as separate independent variables, the coefficient of determination is .52 in 1981 up from .44 in 1980. When the data for technical, semi-technical and village irrigation are combined, there is no measurable correlation between extent of irrigation and cropping intensity. This suggests that village irrigation may not be able to sustain a dry season crop in many cases. This is likely since village irrigation in some cases utilizes water from streams where flows are inadequate in the dry season.

There is a need to undertake a study of water use and availability in Kabupaten Luwu so that the extent of available resources and their quality can be appraised.

5.4.8. Agricultural Inputs

A significant variable affecting crop production is the extent of use by farmers of fertilizers, pesticides and herbicides (which collectively will be termed chemicals), seeds, and mechanization. The costs of these are shown in table 5.12 in terms of constant prices for either purchasing these commodities, or renting in the case of mechanization.

TABLE 5.10

ESTIMATED SAWAH CROPPING INTENSITY
BY KECAMATAN IN 1980 AND 1981

	1980	1981
Larompong	135	94
Suli	86	67
Bajo	97	103
Bastem	95	162
Bupon	117	91
Wara	56	79
Walenrang	126	168
Sabbang	84	130
Limbong	113	111
Masamba	83	63
Malangke	93	97
Bone Bone	163	215
Wotu	84	83
Mangkutana	64	63
Malili	104	92
Nuha	52	101
Total	106	116

SOURCE: Derived from data from BAPPEDA Kabupaten Luwu, and Dinas Pertanian.

Sales of chemicals to farmers have been erratic during the past 11 years for which data are available. Sales grew rapidly from 1970-1971 to 1976-1977 but since have varied being as high as Rp. 367.2 million in value in 1981-1982 rising from Rp. 76.1 million in 1980-1981.

Certified seed sales each year have varied also and were Rp. 18.2 million in 1981-1982.

Growth of mechanization has been striking with rentals and energy cost of Rp. 2.3 million in 1975-1976 to Rp. 173.3 million in 1980-1981 during which the cost of this input amounted to 69 percent of total purchased farm inputs.

very substantial increase in purchases of

While
seeds occured in 1981-1982, funds devoted to
chemicals ar
sing mechanized equipment decreased.
renting and
ise number of buyers of these farm inputs is
The pr
ne data can be put into perspective by
not known.
ow much was purchased per farm family. This
determining
s shown below.
information

TABLE 5.11

RCHASED FARM INPUTS PER FARM FAMILY
(IN 1978 RUPIAH)

	Chemicals	Seeds	Mechanization	Total
1979-1980	2,516	61	1,914	4,491
1980-1981	1,080	41	2,458	3,579
1981-1982	5,210	258	1,692	7,160

SOURC
BAPPEDA, Kabupaten Luwu.

The d
in table 5.11 are averages and are based upon
all famili
in 1980 rather than only those who purchased
these inp
While not a precise comparison, the
informati
uggests that use of farm inputs, while having
increased
arkably in the past 11 years and particularly
in 1981-1
is not as widespread as it should be.

The
ed increase in 1981-1982 in the purchase of
chemicals
seeds was accounted for by only a few

TABLE 5.12

AGRICULTURAL INPUTS BY YEAR

	Million 1978 Rupiah				Percent of Total			
	Chemicals	Seeds	Mechanization	Total	Chemicals	Seeds	Mechanization	Total
1970-1971	33.8	-	-	33.8	100.0	-	-	100.0
1971-1972	29.8	-	-	29.8	100.0	-	-	100.0
1972-1973	30.7	-	-	30.7	100.0	-	-	100.0
1973-1974	10.4	-	-	10.4	100.0	-	-	100.0
1974-1975	54.2	0.9	-	55.1	98.4	1.6	-	100.0
1975-1976	119.8	2.9	2.3	125.0	95.9	2.3	1.8	100.0
1976-1977	126.6	5.3	14.9	146.8	86.2	3.6	10.2	100.0
1977-1978	102.9	14.2	32.5	149.6	68.8	9.5	21.7	100.0
1978-1979	123.2	4.7	99.8	227.7	54.1	2.1	43.8	100.0
1979-1980	177.4	4.3	134.9	316.6	56.0	1.4	42.6	100.0
1980-1981	76.1	2.9	173.3	252.3	30.2	1.1	68.7	100.0
1981-1982	367.2	18.2	119.3	504.7	72.8	3.6	23.6	100.0

SOURCE: BAPPEDA, Kabupaten Luwu.

Kecamatans. Kecamatan Walenrang had a 13 fold increase in purchases compared to the previous year. Purchases by farmers in Kecamatan Bone Bone increased 252 percent, Kecamatan Masamba 262 percent, Kecamatan Suli 377 percent and Kecamatan Bajo 270 percent. Data for all Kecamatans are shown in table 5.13.

The small amounts of chemicals and seeds used when considered on an overall basis are shown in table 5.14. Here is shown the amount expended per hectare of rendengan and gadu paddy for chemicals and seeds by Kecamatan. Rendengan and gadu are lowland paddy grown during the wet season and dry season respectively. They are the types of rice which are likely to have controlled moisture and are thus the more probable candidates for the use of these inputs.

Kecamatans Walenrang, Suli, Bone Bone and Masamba are where these inputs seem to be used the most. Amounts used in the other areas were relatively minor. Even in Kecamatan Walenrang, with average purchases of Rp. 13,000 per hectare, the overall usage in physical terms is quite low.

Prior to 1980-1981 practically all the fertilizers, herbicides and pesticides were purchased from BIMAS/INMAS. The only Kecamatan to have an FCC was Bone Bone. In 1981-1982 the FCCs had sales in 6 of the Kecamatans and accounted for 6 percent of the total sales of chemicals. In

TABLE 5.13

PURCHASED CHEMICALS AND SEEDS BY KECAMATAN
(IN MILLION 1978 RUPIAH)

	1977-78	1978-79	1979-80	1980-81	1981-82
Larompong	1.1	1.6	-	1.3	4.5
Suli	3.4	4.2	5.9	6.2	29.6
Bajo	32.2	32.0	78.7	6.3	23.3
Bastem	-	-	-	0.3	-
Bupon	-	5.2	0.8	6.4	-
Wara	-	1.0	2.6	1.2	3.9
Walenrang	46.6	35.3	44.6	17.0	222.3
Sabbang	2.2	2.2	6.1	1.8	0.3
Limbong	-	-	-	0.3	-
Masamba	3.9	3.3	8.8	6.1	22.1
Malangke	-	-	-	0.6	-
Bone Bone	17.4	29.1	33.7	20.7	72.8
Wotu	-	1.5	-	4.4	0.2
Mangkutana	10.4	12.6	0.5	5.2	6.2
Malili	-	-	-	0.6	0.1
Nuha	-	-	-	0.6	0.1
Total	117.1	127.9	181.7	79.0	385.4

SOURCE: BAPPEDA, Kabupaten Luwu.

some Kecamatans the sales of the cooperatives was a significant portion of total being 100 percent in Kecamatans Wotu, Malili and Nuha, 16 percent in Kecamatan Masamba, 17 percent in Kecamatan Bone Bone and 35 percent in Kecamatan Mangkutana.

5.4.9. Credit

Surprisingly there is considerable variation among the Kecamatans in use of credit by farmers as reported by the Camats. Some report that all farmers use credit while others report that none do. Of those that do, BIMAS and FCCs seem to be the principal sources.

TABLE 5.14

CHEMICALS AND SEEDS PURCHASED IN 1981-1982 PER HECTARE OF PADDY[a] BY KECAMATAN

	In 1978 Rupiah Rupiah per Hectare Thousands
Larompong	3.4
Suli	12.2
Bajo	3.9
Bastem	-
Bupon	-
Wara	5.3
Walenrang	11.8
Sabbang	0.1
Limbong	-
Masamba	7.4
Malangke	-
Bone Bone	8.5
Wotu	0.2
Mangkutana	2.9
Malili	0.2
Nuha	0.2
Total	6.2

SOURCE: Calculated from data from BAPPEDA, Kabupaten Luwu.

[a]Rendengan and gadu planted.

5.4.10. Agricultural Production

There are five general types of agricultural crops grown in Kabupaten Luwu. These are rice, vegetables, staple food (or field) crops, fruits and estate crops. Paddy is comprised of wet season rice or rendengan grown on sawah or low lying land, gadu or dry season rice grown on sawah and

ladang or upland rice. The vegetables include a variety of crops which are grown on special plots usually in the farmstead area. There are six staple food crops: maize, soybeans, cassava, sweet potatoes, peanuts and mung beans. These are grown on unirrigated land either on the higher ground or in the intermediate area.

TABLE 5.15

SOURCES OF PURCHASES OF CHEMICAL INPUTS AS A PERCENTAGE OF TOTAL

	1970-1980		1980-1981		1981-1982	
	BIMAS/ INMAS	FCC	BIMAS/ INMAS	FCC	BIMAS/ INMAS	FCC
Larompong	-	-	100	-	100	-
Suli	100	-	100	-	100	-
Bajo	100	-	100	-	100	-
Bastem	-	-	100	-	-	-
Bupon	100	-	96	4	-	-
Wara	100	-	100	-	-	-
Walenrang	100	-	98	2	100	-
Sabbang	100	-	100	-	100	-
Limbong	-	-	100	-	-	-
Masamba	100	-	49	51	84	16
Malangke	-	-	100	-	-	-
Bone Bone	75	25	58	42	83	17
Wotu	-	-	41	59	-	100
Mangkutana	100	-	70	30	65	35
Malili	-	-	94	6	-	100
Nuha	-	-	98	2	-	100
Total	95	5	78	22	94	6

SOURCE: BAPPEDA, Kabupaten Luwu.

Agricultural statistics show fruit and estate crops in terms of numbers of trees rather than in hectares. Often these types of crops are grown in the farmstead area of the cultivator. A variety of fruits are grown. Estate crops include coconut, cloves, coffee, kapok and a number of others.

Overall 80 percent of the land planted to paddy, vegetables and staple food crops in 1981 was devoted to paddy; 17 percent was used for staple food crops and 3 percent for vegetables. The percentage of farmed land devoted to paddy varied from 50 percent in Kecamatan Wotu to 97 percent in Kecamatan Walenrang. The mountainous Kecamatans of Limbong and Bastem as well as Kecamatans Wotu and Mangkutana had well over a fifth of their land used for staple food crops.

The total value of food crops produced in 1980 in terms of farmgate prices was Rp. 17.4 billion. Paddy comprised 94 percent of this , while field crops, fruits and vegetables made up three, two and one percent respectively.[1]

5.4.10.1. Hectares of Rice Planted

Hectares planted to paddy in 1981 numbered 72,734. Kecamatan Walenrang accounted for 27 percent of this total. Together the six Kecamatans of Walenrang, Bone Bone, Bupon,

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[1]BAPPEDA, Kabupaten Luwu, unpublished.

Bajo, Limbong and Mangkutana accounted for almost three-fourths of the hectares planted to rice.

The bulk of the paddy planted in 1981 was rendengan or lowland rain fed rice. Dry season paddy totalled 21 percent of total and upland rice 15 percent.

	Hectares Planted 1981	Percent of Total
Rendengan (rainy season lowland)	46,802	64
Gadu (dry season lowland)	15,232	21
Ladang (upland)	10,700	15
Total	72,734	100

Plantings of paddy have generally increased each year during the period since 1974. The year 1974 is used as a base period since this is the first year for which detailed data are available.

Hectares planted to paddy have increased from 35 thousand in 1974 to 73 thousand in 1981, an increase of 11 percent per year during the period. Plantings of rendengan or rain fed lowland rice have increased from 29 thousand hectares in 1974 to 47 thousand in 1981 or 7 percent per year while gadu or dry season rice had a much higher percentage gain during the period of 33 percent per year from a very small base of 2.1 thousand hectares in 1974.

TABLE 5.16

TRENDS OF PADDY PLANTED
000 HECTARES

	Rendengan	Gadu	Ladang	Total
1974	28.9	2.1	4.2	35.2
1975	31.7	2.1	5.5	39.3
1976	34.7	5.0	6.8	46.5
1977	30.6	14.3	11.2	56.1
1978	56.0		8.6	64.6
1979	23.3	22.8	10.6	56.7
1980	30.2	26.6	11.5	68.3
1981	46.8	15.2	10.7	72.7

SOURCE: Dinas Pertanian.

Ladang or upland rice plantings vary considerably from year-to-year but overall have grown 14 percent per year during the period.

In general the trend of hectares of rendengan planted has been upward in most Kecamatans. The two southern Kecamatans of Larompong and Suli show significant long-term decreases in rendengan planted while Kecamatan Bajo was down a very small amount. Kecamatans Wara and Nuha also had a decrease in the emphasis on rendengan (see table 5.17).

The other Kecamatans had increases in plantings of rendengan. In the case of Sabbang, Wotu, Masamba and Bupon, the increases were quite significant being 32 percent, 23 percent, 21 percent and 20 percent respectively. The biggest absolute increase was in Kecamatan Bupon with a gain of about 5,500 hectares.

TABLE 5.17

HECTARES OF RENDENGAN PLANTED BY YEAR AND BY KECAMATAN

	1974	1975	1976	1977	1978[a]	1979[a]	1980	1981
Larompong	2,500	2,203	2,250	175			200	790
Suli	2,455	2,374	2,388	1,380			1,000	1,778
Bajo	5,240	5,676	5,576	4,005			2,150	4,787
Bastem	825	480	800	100			1,000	1,700
Bupon	2,082	4,210	4,821	673			2,000	7,503
Wara	1,050	945	902	835			500	705
Walenrang	7,713	7,300	8,937	9,434			8,054	11,303
Sabbang	484	806	1,853	2,779			2,210	3,363
Limbong	760	1,347	1,225	1,400			2,173	2,138
Masamba	749	1,692	1,882	2,109			3,754	2,800
Malangke	1,085	1,422	314	1,759			1,400	1,372
Bone Bone	1,958	1,427	1,912	3,596			2,500	4,557
Wotu	248	291	92	208			1,000	1,037
Mangkutana	709	769	982	1,519			1,500	1,973
Malili	350	315	300	305			450	405
Nuha	660	465	463	365			307	591
Total	28,868	31,722	34,707	30,642			30,198	46,802

SOURCE: Dinas Pertanian.

a data for rendengan are not shown separately.

TABLE 5.18

HECTARES OF GADU PLANTED BY YEAR AND BY KECAMATAN

	1974	1975	1976	1977	1978[a]	1979[a]	1980	1981
Larompong	191	-	-	2,196			1,698	533
Suli	-	-	-	1,350			2,076	645
Bajo	-	-	1,380	1,009			3,547	1,231
Bastem	-	-	-	930			-	-
Bupon	156	47	-	4,749			7,868	145
Wara	24	11	-	-			-	-
Walenrang	547	267	792	1,685			6,045	7,581
Sabbang	292	125	-	95			306	528
Limbong	180	180	-	-			-	-
Masamba	228	-	-	-			174	185
Malangke	45	70	450	605			-	80
Bone Bone	452	1,344	2,403	1,690			3,988	4,003
Wotu	-	65	-	10			143	95
Mangkutana	2	35	-	-			715	195
Malili	20	-	-	-			20	10
Nuha	-	-	-	-			-	-
Total	2,137	2,144	5,025	14,319			26,580	15,232

SOURCE: Dinas Pertanian.

a Data for gadu are not shown separately.

TABLE 5.19

HECTARES OF LADANG PLANTED BY YEAR AND BY KECAMATAN

	1974	1975	1976	1977	1978	1979[a]	1980	1981
Larompong	415	301	-	75	-		489	27
Suli	45	155	43	160	174		3	19
Bajo	60	45	12	85	60		424	464
Bastem	2	250	300	400	600		518	900
Bupon	76	175	36	246	371		345	409
Wara	242	150	79	77	95		92	107
Walenrang	504	120	691	1,513	721		1,258	673
Sabbang	260	180	472	616	381		91	63
Limbong	835	1,735	3,375	4,130	2,607		2,199	3,376
Masamba	644	835	521	761	659		402	760
Malangke	26	149	315	-	-		130	77
Bone Bone	46	180	100	371	250		289	83
Wotu	92	501	204	1,144	985		833	525
Mangkutana	201	181	123	1,190	1,303		3,691	2,698
Malili	260	255	240	140	175		525	355
Nuha	291	260	264	248	251		219	164
Total	4,199	5,472	6,775	11,156	8,632		11,508	10,700

SOURCE: Dinas Pertanian.

The cultivation of gadu, or dry season rice has increased very substantially, an average of 33 percent per year over the entire Kabupaten. Only the four Kecamatans of Bastem, Wara, Limbong, and Nuha did not report any gadu sown in 1981. Almost half of the gadu planted in 1981 was in Kecamatan Walenrang. Kecamatan Bone Bone reported an additional 26 percent of total gadu in the Kabupaten. Both of these Kecamatans which had significant hectares of gadu or irrigated paddy planted in 1981 (7,868 hectares in Kecamatan Walenrang and 4,003 hectares in Kecamatan Bone Bone) had about 500 hectares planted in 1974.

Paddy ladang planted varies from year-to-year but has increased over the period since 1974. All of the Kecamatans reported some ladang planted. The greatest amount was in Kecamatan Limbong with 3,376 hectares with the next highest amount being in Kecamatan Mangkutana with 2,698 hectares (see table 5.19).

According to reports from the Kecamatans, there is usually no difference in the variety of paddy planted in the rendengan and gadu seasons[1]. The only apparent difference between the two crops is statistical, i.e., if the paddy is harvested before July, it is termed rendengan. Lowland rice harvested in July or later is classified as gadu. It is

[1]The current year is an exception because of seeds provided by government under the Lappo Ase program.

true, of course, that the later in the rainy season the paddy is planted, the more likely it is to require irrigation for full development.

Based upon the above information, it is obvious that if planting of paddy is delayed during the rainy season because of excess rainfall or poor drainage, gadu for that year may

TABLE 5.20

HECTARES OF PADDY RENDENGAN AND GADU PLANTED BY YEAR

	000 Hectares
1974	31.0
1975	33.8
1976	39.7
1977	44.9
1978	56.0
1979	46.1
1980	56.8
1981	62.0

SOURCE: Dinas Pertanian.

show an increase on a statistical basis. This makes it difficult to determine statistical trends for the two types of rice as evidenced in tables 5.18 and 5.19. Therefore the two types of lowland rice will be combined as shown for statistical purposes.

The average annual increase in hectares planted during the period 1974 to 1981 was 10.5 percent per year. If this

trend is projected to 1988 or five years after completion of the development plan, the total hectares planted will be 92 thousand hectares. This would mean that the hectares planted would expand 30 thousand during the seven year period between 1981 and 1988. This compares with an expansion of 31 thousand during the previous seven years.

Much of the increase would stem from planting a second crop. The present trend toward increased utilization of land and water is expected to continue. Gadu hectares planted have increased from 2.1 thousand in 1974 to 15.2 thousand in 1981. The Lappo Ase program should also influence the existing trend toward more dry season rice production. Hectares planted to gadu in 1988 are estimated to number 28 thousand.

In 1980 it was estimated that over 30 thousand hectares were under irrigation in the Kabupaten. As previously noted, a significant portion of the village irrigation systems are described as being in "poor" condition. Therefore the scope of the extension services will have to be widened to assist farmers improve operation of their existing irrigation systems to achieve this growth in hectares planted. In addition, the technical and semi-technical systems will have to be expanded.

Rendengan planted is estimated to increase from 47 thousand hectares in 1981 to 64 thousand in 1988. This is about the same as the expansion of rainy season paddy planted during the period 1974 to 1981. According to available data sufficient undeveloped land is available to do this. The trend toward tillage of more land is expected to continue.

Cropping intensity on sawah will thus be about 134 in 1988. If this proves to be true, Luwu will still not be an area of intensive cultivation as measured by many Asian areas.

Ladang planted has been increasing at a relatively modest rate. This should continue as more upland area land is gradually developed. Ladang planted in 1988 is expected to be 12 thousand hectares. This compares with 10.7 thousand in 1981.

5.4.10.2. Hectares of Rice Harvested

Hectares harvested have increased substantially during the past seven years. The increase has amounted to 13 percent on an overall basis.

While complete crop failure appears to have been nonexistent in Kabupaten Luwu in recent years, some of the land planted is not harvested. Based upon data back to 1974, on average, 91 percent of rendengan planted is harvested, 86 percent of gadu and 79 percent of the ladang. These data refer to hectares where failure was complete and

do not include partial losses due to pests, disease, drought or flooding. This is shown in table 5.22.

TABLE 5.21

TRENDS OF PADDY HARVESTED

	000 Hectares			
	Rendengan	Gadu	Ladang	Total
1974	22.5	1.2	3.4	27.1
1975	30.4	2.0	3.3	35.7
1976	33.8	5.0	4.4	43.2
1977	26.9	9.6	6.9	43.4
1978	50.6		7.8	58.4
1979	na	na	na	61.7
1980	29.3	23.9	9.2	62.4
1981	44.9	12.5	7.7	65.1

SOURCE: Dinas Pertanian.
na not available

TABLE 5.22

HECTARES HARVESTED AS A PERCENTAGE OF HECTARES PLANTED IN KABUPATEN LUWU BY YEAR

	Rendengan	Gadu	Ladang
1974	78	57	80
1975	96	96	61
1976	97	99	65
1977	87	67	62
1978	90		91
1979	82	95	95
1980	97	90	80
1981	97	98	98
Mean	90.6	86.0	79.0
Standard Deviation	± 8.1	±16.9	±15.0

SOURCE: Dinas Pertanian.

The figures are subject to the following interpretation. In 68 percent of the years, hectares harvested will be:

81 percent or more of hectares planted in the case of rendengan

69 percent or more of hectares planted in the case of gadu

64 percent or more of hectares planted in the case of ladang

These data indicate that, as would be expected, ladang and gadu are much more subject to crop failure than the rainy season rice. This is reasonable since gadu is dependent upon irrigation and for various reasons there may be a lack of water at the time it is required.

The reasons for ladang crop failure are less easy to rationalize. Devastation by wild pigs and untended animals has been cited by the Camats as a problem. Intuitively there may be the problem of too much or too little rainfall at a given time.

As indicated by the foregoing data, 1981 was an exceptional year for all types of rice in that there were small losses due to crop failure. While there were some differences among the Kecamatans, they were not great compared to some other years.

TABLE 5.23

HECTARES HARVESTED AND HECTARES HARVESTED
AS A PERCENTAGE OF HECTARES PLANTED BY KECAMATAN IN 1981

	Rendengan		Gadu		Ladang		Total	
	Hectares Harvested	Percentage of Planted	Hectares Harvested	Percentage of Planted	Hectares Harvested	Percentage of Planted	Hectares Harvested	Percentage of Planted
Larompong	745	94	450	100	27	100	1,222	96
Suli	1,778	100	564	87	17	100	2,359	97
Bajo	4,785	149	69	93	464	100	5,318	100
Bastem	1,670	98	-	-	900	100	2,570	99
Bupon	7,471	100	140	97	409	100	8,020	100
Wara	672	95	-	-	107	100	779	96
Walenrang	10,495	93	6,386	98	608	90	17,489	95
Sabbang	2,989	90	516	99	30	97	3,535	91
Limbong	2,060	97	-	-	1,480	100	3,540	98
Masamba	2,619	100	105	100	610	100	3,334	100
Malangke	1,372	100	-	100	77	100	1,449	100
Bone Bone	4,548	100	3,999	100	78	94	8,625	100
Wotu	970	100	84	88	455	91	1,509	97
Mangkutana	1,806	97	188	96	2,090	97	4,084	97
Malili	405	100	10	100	180	100	595	100
Nuha	502	100	-	-	129	100	631	100
Total	44,887	97	12,511	98	7,661	98	65,059	97
Standard Deviation		3.2		4.7		3.4		2.6

SOURCE: Dinas Pertanian.

The implications of this are:

1) With limited resources, it is better to concentrate applications of inputs on redengan rather than gadu or ladang since the chances of crop failure are less in the case of rendengan than the other two types of rice.

2) Since the problem of crop failure of gadu is possibly due to faulty or lack of irrigation, consideration should be given to a program to assist farmers with their "village" irrgation systems. This includes management, operation, maintenance and engineering problems. If a trained irrigation specialist cum extension serviceman could improve water conditions only slightly, the potential yield of gadu is such that the returns could be quite significant. Additionally, this activity might ease the transition from village to technical irrigation systems in those areas where the latter are being developed.

3) Effort should be made to ascertain why the failure rate of ladang is high and a program should be undertaken to minimize it.

Based upon the estimated hectares planted during the forecast period to 1988, it is now possible to estimate hectares harvested. This can be done by applying the mean of the percentage that hectares harvested comprise of hectares planted during the base period of 1974 to 1981.

	Rendengan	Gadu	Ladang	Total
Hectares planted 1988 (000)	64	28	12	104
Percent of plantings that are harvested	90.6	86.0	79.0	-
Hectares harvested 1988 (000)	58	24	10	92

Hectares harvested will total 92 thousand in 1988 based upon past trends and experience. This is an average annual increase of 5 percent from 1981.

5.4.10.3. Production and Yield of Rice

Overall production has increased significantly in Kabupaten Luwu during the period since 1974. While there have been some increases in yield per hectare, most of the increase in production stems from increased hectares harvested.

Total paddy production has increased at an annual rate of 16 percent the past seven years. In 1981 it totalled 222 thousand tons. The base year of 1974 was apparently a year of considerable crop failure and production was somewhat below that of 1975. Therefore the trend may be distorted upward somewhat. Using 1975 as a base, production has increased at an annual rate of 12 percent. This is still a very significant gain (see table 5.24).

The three leading producers of paddy among the Kecamatans are Walenrang, Bupon and Bone Bone. Together these Kecamatans produce almost three-fifths of the rice in Luwu. Kecamatan Bajo and Mangkutana are also important growing areas, accounting for 9 percent and 6 percent of total for the Kabupaten respectively (see tables 5.26, 5.27).

Shown in the following tabulation are the percentage increases in paddy production since 1975-1976 which are due to increases in hectares harvested and yield for the three types of paddy.

Percentage of production increase attributable to:

	Rendengan	Gadu	Ladang	Total
Hectares planted	78	86	55	78
Yield	22	14	45	22

From the above, it is quite apparent that in the case of all three types of paddy, most of the increase in production has stemmed from more land being brought into cultivation.

These gains have been converted to tons of paddy as shown below:

	Rendengan	Gadu	Ladang	Total
Total increase 1975 to 1981	61.6	37.3	10.9	109.8
Amount attributable to increased land	48.1	32.0	6.0	86.1
Amount attributable to increased yield	13.5	5.3	4.9	23.7

TABLE 5.24

PRODUCTION IN THOUSAND TONS AND YIELD IN TONS OF PADDY BY YEAR

	Rendengan				Gadu		Ladang		Total	
	Production	Yield			Production	Yield	Production	Yield	Production	Yield
1974	69.0	3.1			2.3	1.9	5.2	1.6	76.5	2.8
1975	101.1	3.3			6.1	3.0	4.5	1.4	111.7	3.1
1976	134.4	4.0			14.4	2.9	7.4	1.7	156.2	3.6
1977	100.4	3.7			34.5	3.6	10.2	1.8	145.1	3.4
1978	a	a	167.6	3.3	a	a	12.6	a	180.3	3.1
1979	a	a			a	a	a	1.6	151.2	2.4
1980	99.4	3.4			80.1	3.4	17.4	1.9	196.9	3.2
1981	162.8	3.6			43.3	3.5	15.4	2.0	221.5	3.4

SOURCE: Dinas Pertanian.

a not available

While there can be no doubt that these are sizeable increases in production, the question remains whether the people are better off. Based upon estimated food farm population, the per capita production of paddy has increased from 380 kilograms in 1975 to 500 kilograms in 1981. This is a significant improvement.

A notion concerning potential increases in yield can be provided by reviewing the results of experimental farm plots. These indicate that yields of rendengan could theoretically be doubled from the 1981 level to be on the average of seven tons of unhulled rice per hectare. These are not practical goals, however, in the intermediate term.

Perhaps a better measure of production per hectare is the yield achieved in other areas of South Sulawesi. Data are available for these areas for 1980.

Yield of rendengan and gadu paddy per hectare in Kabupaten Luwu were considerably below those of South Sulawesi as a whole in 1980. The overall paddy yield in Kabupaten Luwu ranks near the bottom of the group of 23 Kabupatens comprising the Province. In the case of rendengan, the yield in Kabupaten Luwu in 1980 was seventeeth among the 23 Kabupatens; gadu yield ranked twentieth; and ladang yield stood above the Provincial average and in ninth place among the 18 Kabupatens growing this type of rice.

TABLE 5.25

PADDY YIELDS IN SELECTED KABUPATENS
IN SOUTH SULAWESI

1980

	Hectares Harvested 000	Tons Per Hectare
Rendengan		
Luwu	29.3	3.4
South Sulawesi	443.1	4.0
Majene	0.5	5.0
Barru	11.3	6.0
Soppeng	18.8	5.0
Pinrang	23.9	5.2
Pangkep	20.8	5.1
Polmas	16.8	4.8
Enrekang	4.9	4.2
Gadu		
Luwu	23.9	3.4
South Sulawesi	146.3	5.0
Majene	0.1	5.2
Pinrang	33.4	5.8
Soppeng	11.7	6.5
Sidrap	18.5	5.7
Polmas	8.0	5.5
Maros	3.1	4.9
Tana Toraja	3.3	4.7
Ladang		
Luwu	9.2	1.9
South Sulawesi	29.8	1.8
Gowa	0.4	2.6
Pinrang	0.1	2.4
Takalar	0.3	2.3
Polmas	1.0	2.0
Soppeng	0.7	1.9
Pangkep	0.6	1.9
Maros	0.1	1.9

SOURCE: Sulawesi Selatan Dalam Angka 1980.

None of the Kecamatans in 1980 reported better overall yields of paddy than the average for the Province. In 1981, which according to the statistics appears to have been a good crop year for paddy, Luwu yields were better and overall yield in Kecamatan Bupon was higher than the Province 1980 average while the yield in Kecamatan Suli equalled the 1980 Province figure.

Since yields in nearby Kabupatens and in South Sulawesi can be instructive in the evaluation of Luwu agriculture and what might be expected in the future, they are shown in table 5.25.

The Kabupatens shown in table 5.25 have been selected to illustrate that Kabupaten Luwu yields are relatively low at present and to suggest the scope for their improvement in the future. Some of the areas shown have few hectares in rice culture and yield understandably might in those circumstances be high. Nonetheless, some Kabupatens with areas harvested that are similar to the magnitude of those in Luwu, do have yields which are considerably in excess of the ones in this Kabupaten.

The areas listed are not necessarily similar to those of Luwu in terms of soil or climate. The cultural background of the farmers should be the same, however. The average yields recorded in these areas could not be achieved without extensive use of improved farming practices.

Therefore, the conclusion that improved methods could also be further introduced to the local cultivators with considerable benefit to paddy production seems inescapable.

The historic trend of yield per hectare of rendengan in Luwu is somewhat flatter than that of South Sulawesi. With increased emphasis on improved farming practices, it is not unreasonable to expect the upward trend of yield in Luwu to parallel the existing one for Province. If so, the average annual yield will increase 3.6 percent per year during the next 7 years to 1988 compared to 1.7 percent during the past 7 years. Yield per hectare in 1988 will thus be 4.5 tons.

The historic trend of gadu yield per hectare has been increasing at 2.6 percent per year. This compares with a corresponding figure of 6.6 percent for the Province as a whole. With increases in the use of improved inputs, substantial increases in yields should occur.

For the purposes of estimating production, it is assumed that beginning about 1984, the uptrend of the gadu yield in Luwu will parallel the one for South Sulawesi. If this is a reasonable assumption, yield of gadu in Kabupaten Luwu in 1988 will average 5.2 tons per hectare. This compares with 3.5 in 1981 and a yield of 4.5 tons if the existing past trend is continued.

Since ladang paddy is not irrigated, there is reduced scope for increasing yield of this type of rice. A

TABLE 5.26

PADDY PRODUCTION IN 1981

	Tons				
	Rendengan	Gadu	Ladang	Total	Percent of Total
Larompong	2,260	1,583	50	3,893	2
Suli	7,180	2,546	19	9,745	4
Bajo	17,944	361	385	18,690	8
Bastem	3,696	-	1,340	5,036	2
Bupon	36,982	517	888	38,387	17
Wara	2,292	-	309	2,601	1
Walenrang	42,399	19,914	817	63,130	28
Sabbang	4,150	1,548	55	5,753	3
Limbong	5,649	-	3,057	8,706	4
Masamba	6,850	383	1,221	8,454	4
Malangke	5,676	-	154	5,830	3
Bone Bone	15,717	15,620	117	31,454	14
Wotu	2,730	202	954	3,886	2
Mangkutana	7,405	678	5,635	13,718	6
Malili	466	12	165	643	a
Nuha	1,392	-	210	1,602	1
Total	162,788	43,364	15,376	221,528	100

SOURCE: Dinas Pertanian.
a less than 0.5 percent.

TABLE 5.27

YIELD PER HECTARE BY TYPE OF PADDY
AND BY KECAMATAN
TONS

	1980				1981			
	Rendengan	Gadu	Ladang	Total	Rendengan	Gadu	Ladang	Total
Larompong	3.1	3.1	1.8	2.8	3.0	3.5	1.9	3.2
Suli	3.4	3.2	-	3.3	4.0	4.5	1.1	4.1
Bajo	3.5	3.4	1.9	3.4	3.8	5.2	0.8	3.5
Bastem	3.2	-	1.8	2.8	2.2	-	1.5	2.0
Bupon	3.6	3.4	2.0	3.4	5.0	3.7	2.2	4.8
Wara	3.3	-	1.8	3.0	3.4	-	2.9	3.3
Walenrang	3.6	3.4	1.8	3.4	4.0	3.1	1.3	3.6
Sabbang	3.3	3.2	2.0	3.3	1.4	3.0	1.8	1.6
Limbong	3.0	-	2.1	2.8	2.7	-	2.1	2.5
Masamba	3.4	3.4	2.3	3.3	2.6	3.6	2.0	2.5
Malangke	3.1	-	1.7	3.0	4.1	-	2.0	4.0
Bone Bone	3.2	3.4	1.8	3.3	3.5	3.9	1.5	3.7
Wotu	3.4	3.4	1.9	2.8	2.8	2.4	2.1	2.6
Mangkutana	3.3	3.3	1.8	2.4	4.1	3.6	2.7	3.4
Malili	3.1	3.1	1.8	2.6	1.2	1.2	0.9	1.1
Nuha	3.6	-	1.8	2.9	2.8	-	1.6	2.5
Total	3.4	3.4	1.9	3.2	3.6	3.5	2.0	3.4
South Sulawesi	4.0	5.0	1.8	4.1	-	-	-	-

SOURCE: Dinas Pertanian

continuation of the existing trend should continue. If so, yield in 1988 will be 2.3 tons per hectare.

Using the estimated hectares harvested and the above yields per hectare for 1988, production of paddy will be 431 thousand tons. This is an increase of 210 tons or 95 percent from the corresponding figure for 1981.

If these estimates are reasonably correct, gadu, or dry season paddy, will be much more important to total production than now. Gadu will comprise 29 percent of total production compared to 20 percent in 1981. The portion that each type of paddy comprises of total is shown below.

	Percentage of Total	
	1981	1988
Rendengan	73	61
Gadu	20	29
Ladang	7	10
Total	100	100

It is not purported that the extrapolations discussed above and resulting in production estimates shown in table 5.28 are forecasts. Instead they are intended to illustrate a minimum of what could be produced in Kabupaten Luwu if (1) more land is brought under irrigation; (2) the ancillary supporting inputs including increased farm mechanization are provided; and (3) cultivators have an incentive to produce more.

TABLE 5.28

CONCEIVABLE PADDY PRODUCTION IN 1988

	Rendengan	Gadu	Ladang	Total
Hectares harvested 1981 (000)	44,887	12,511	7,661	65,059
Yield in tons per hectare 1981	3.63	3.47	2.01	3.41
Production in tons 1981	162,788	43,364	15,376	221,528
Hectares harvested 1988 (000)	58	24	10	92
Yield in tons per hectares 1988	4.5	5.2	4.5	4.7
Production in tons 1988	261	125	45	431
Increase 1981-1988				
Tons (000)	98	82	30	210
Percent increase	60	189	195	95
Average annual increase	7	16	17	10

Emphasis on the extension program to teach farmers how to use improved practices will be required. The means to distribute farm inputs effectively and market farm products for all farmers will also have to be provided. While the technical irrigation systems will be expanded, the bulk of the production increases will have to be on land under irrigation by village systems. This means that education and assistance in village irrigation systems management,

maintenance and operation will be required. As indicated previously, improvement of these systems is needed.

5.4.10.4. Lappo Ase Program

As part of the effort to introduce improved farming practices into the agricultural sector, the government has undertaken the Lappo Ase program. This name literally means "accumulate rice" in English and this is one of the purposes of it.

Specially, the purposes of the program are to

1) increase farmers' income;
2) decrease the incidence of crop failure; and
3) increase the rice stock of Eastern Indonesia.

This program was undertaken in six Kabupatens in South Sulawesi in 1981. In 1982 it was introduced in Kabupatens Wajo and Luwu and continued in the six kabupatens.

The program is the responsibility of the Camat of the Kecamatan. The government supports the program by providing:

1) a staff in each Kecamatan to guide and supervise farmers as required;
2) educational courses for participating farmers;
3) credit through the national bank (BRI);
4) farm inputs;
5) storage, and
6) help in putting irrigation systems in good order.

Thus the program is a general effort to coordinate the roles of the existing agricultural support organizations of government.

Eleven of the 16 kecamatans in Luwu participated in the program. Hectares planted totalled 15,936. This is 5 percent more than hectares planted to gadu in these areas in 1981. Therefore, the total hectares planted under the program is not much larger than what might be considered as normal.

Yields are reported to be much higher than normal and exeed 5 tons of gabah per hectare on those areas harvested by November 1, 1982. If this yield is achieved for the entire program, the achievement is quite remarkable and hopefully bodes well for the future.

The program, however, is new and it is not known whether the knowledge the farmers gained will be utilized in the future. As one of the Camats commented, however, the main benefit of the program was the coordi ation of the agencies in their existing responsibilities. Thus one would think this would carry forward into the future.

5.4.10.5. Factors Affecting Paddy Yield

A multiple regression study was undertaken to determine the independent factors or variables that affect the yields of paddy. Yield considered in this case is total production of rendengen and gadu during a year divided by the hectares of developed sawah available.

TABLE 5.29

TONS OF PADDY[a] PER HECTARE OF AVAILABLE SAWAH IN 1981

	Tons
Larompong	2.7
Suli	2.7
Bajo	3.1
Bastem	3.5
Bupon	4.5
Wara	2.6
Walenrang	5.6
Sabbang	1.9
Limbong	2.9
Masamba	1.5
Malangke	3.8
Bone Bone	7.9
Wotu	2.1
Mangkutana	2.3
Malili	1.1
Nuha	2.4
Total	3.9

SOURCES: BAPPEDA, Kabupaten Luwu and Dinas Pertanian.
a Rendengen and gadu

Total tons of paddy per hectare of sawah available is probably the best way to evaluate the production of a given area since it is a measure of the capability and inclination of the farmers to grow a second crop, apply improved farm inputs in the proper doses, and use irrigation. Shown in table 5.29 are the total yields of paddy per hectare of available hectares of sawah.

As shown here, Kecamatan Bone Bone has a total rice production of 7.9 tons per hectare on this basis while

Kecamatan Walenrang's total is 5.6 tons per hectare. These reflect the observed tendency of these farmers to use irrigation water as well as improved farming practices.

Six independent variables were tested to determine the extent to which changes in yields were affected by them. These variables were those it was believed might affect production. Variables considered were:

a) percentage of developed sawah under technical irrigation systems;

b) percentage of developed sawah under semi-technical irrigation systems;

c) percentage of developed sawah under village irrigation systems;

d) chemicals and seeds used per hectare of developed sawah expressed in 1978 rupiah;

e) percentage of the village irrigation facilities in poor condition, and;

f) percentage of farmers owning their land.

Overall the coefficient of determination developed by the regression program was .71. This indicates a considerable relationship. The independent variables with the most influence on yields were farm inputs and the engineered irrigation systems. Tenure seemed to have little influence while village irrigation systems indicated some effects.

Data concerning some of the variables did not appear to be good quality. This was particularly true, as previously mentioned, of the hectares of developed sawah, percentage of hectares covered by village irrigation, and the measure of quality of the village irrigation. An increased coefficient of determination would doubtless result from use of better quality data.

The fact that the existing data indicate that engineered irrigation systems and farm inputs are significant factors affecting production of rice affirms the necessity of continuing the areas of emphasis of the existing development program if the sector is to develop. These areas are irrigation, farmer education through the extension service, and the supply of improved farm inputs.

5.4.11. Vegetables and Fruits

Vegetables and fruits are generally grown in the cultivators' farmersteads for their own use. Statistics concerning these crops appear to be rather sketchy. According to the data available, about 400 square meters on the average are devoted to vegetable production per farm.

It would appear reasonable that some farmers might grow some vegetables for market in Palopo. This does not seem to be the case. Most of the vegetables sold in Palopo come from outside the Kabupaten.

In general, vegetables and fruits seem to be grown for the cultivator's own consumption. It seems unlikely they will contribute significantly to farmers' monetary income during the intermediate term.

5.4.12. Field Crops

Field crops have not yet become of great importance in the farm economy of Kabupaten Luwu. In 1981, 15,200 hectares of field crops were planted. These crops consist of maize, soybeans, cassava, sweet potatoes, peanuts and mung beans and comprised only 17 percent of total crops planted (not including fruits and estate crops for which information concerning plantings is often provided in terms of numbers of trees). In addition, hectares planted to field crops during the past 8 years have increased at an average annual rate of only 3 percent. This is not a great amount considering the relatively small amounts planted.

Perhaps one reason there has been little interest in expanding production of these crops is their high incidence of crop failure.[1] During the period 1974 to 1981, 31 percent of the hectares planted to these crops have failed. This is not as a result of complete crop failure in one or two years during the period. Rather, the failure rate is consistent as measured by the standard deviation which is

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[1]The Camat of Kecamatan Suli stated that this is indeed the reason farmers do not attempt to grow more of this type of crop.

only 3.6. This means that in 68 percent of the years from 1974 to 1981, the hectares failed comprised between 27.7 percent and 34.9 percent of hectares planted.

The failure rate was fairly uniform for all five crops in this group. Shown below is the average percentage of hectares planted which were harvested and not harvested during the period 1974 to 1981. This information is shown for each year as table 5.30.

	Percent of Land Planted	
	Harvested	Not Harvested
Maize	66	34
Soybeans	78	22
Cassava	58	42
Sweet Potatoes	71	29
Peanuts	76	24
Mung Beans	72	28
Average	70	30

The crop of cassava has the greatest loss each year of any of the six field crops. An average of only 58 percent of the cassava planted was harvested each year during the period 1974 to 1981. Maize also has a relatively high loss rate with 66 percent of the hectares planted being harvested.

While 1981 was a better year than the others on record insofar as a minimization of losses was concerned, some of the Kecamatans suffered quite heavy losses. Kecamatan Limbong overall lost 57 percent of the hectares planted and Kecamatan Bajo had complete crop failure on 34 percent of

TABLE 5.30

FIELD CROPS PLANTED AND HARVESTED BY YEAR

Hectares

	Maize			Soybeans		
	Planted	Harvested	Percent	Planted	Harvested	Percent
1974	5,920	4,216	71	4,301	3,342	78
1975	4,292	3,333	78	3,213	2,534	79
1976	3,283	2,195	67	2,044	1,519	74
1977	5,502	3,343	61	2,655	1,948	73
1978	6,208	4,553	73	3,870	2,960	76
1979	5,665	3,576	63	5,235	4,299	82
1980	7,446	4,120	55	3,250	2,424	75
1981	8,267	5,258	64	2,073	1,804	87
		Mean	66.5			78.0

	Cassava			Sweet Potatoes		
	Planted	Harvested	Percent	Planted	Harvested	Percent
1974	3,982	2,344	59	1,666	164	70
1975	3,664	2,236	61	1,548	1,143	74
1976	2,566	1,375	54	1,208	844	70
1977	2,919	1,596	55	1,435	1,051	73
1978	2,960	1,693	57	1,310	847	65
1979	2,980	1,787	60	1,328	956	72
1980	2,900	1,370	47	1,180	873	74
1981	2,421	1,774	73	974	680	70
		Mean	58.2			71.0

	Peanuts			Mung Beans		
	Planted	Harvested	Percent	Planted	Harvested	Percent
1974	858	536	62	448	293	65
1975	1,156	906	78	378	287	76
1976	854	635	74	177	111	63
1977	1,682	1,225	73	348	312	90
1978	2,254	1,912	85	256	158	62
1979	2,962	2,005	68	391	308	79
1980	3,679	2,924	79	567	355	63
1981	1,082	934	86	865	704	81
		Mean	75.6			72.4

SOURCE: Dinas Pertanian.

TABLE 5.31

HECTARES PLANTED AND HECTARES NOT HARVESTED
AS A PERCENTAGE OF HECTARES PLANTED BY KECAMATAN IN 1981

	Maize		Soybeans		Cassava		Sweet Potato	
	Planted	Percent Not Harvested	Planted	Percent Not Harvested	Planted	Percent Not Harvested	Planted	Percent Not Harvested
Larompong	73	27	-	-	56	46	46	37
Suli	31	19	4	0	21	14	16	25
Bajo	747	49	471	13	16	31	9	44
Bastem	850	6	-	-	160	3	117	3
Bupon	1,968	29	116	0	176	6	61	16
Wara	39	26	-	-	42	29	26	27
Walenrang	158	22	227	7	107	49	74	7
Sabbang	116	29	101	24	112	43	99	29
Limbong	3,264	55	-	-	191	62	93	81
Masamba	59	15	99	16	212	13	64	20
Malangke	54	9	43	12	39	15	20	15
Bone Bone	358	0	331	13	584	27	97	51
Wotu	214	19	258	21	392	17	138	32
Mangkutana	277	14	423	13	277	17	102	25
Malili	50	34	-	-	27	30	6	50
Nuha	9	22	-	-	9	33	6	17
Total	8,267	36	2,073	13	2,421	27	974	30

SOURCE: Dinas Pertanian.

TABLE 5.32

HECTARES PLANTED AND HECTARES NOT HARVESTED AS A PERCENTAGE OF HECTARES PLANTED BY KECAMATAN IN 1981

	Peanuts		Mung Beans		Total	
	Planted	Percent Not Harvested	Planted	Percent Not Harvested	Planted	Percent Not Harvested
Larompong	53	42	7	86	235	39
Suli	17	29	26	9	115	20
Bajo	9	0	295	31	1,547	34
Bastem	65	0	-	-	1,192	5
Bupon	133	0	153	0	2,607	23
Wara	27	26	-	-	134	27
Walenrang	57	9	18	0	641	18
Sabbang	82	15	88	10	598	26
Limbong	-	-	-	-	3,548	57
Masamba	40	15	28	18	502	15
Malangke	4	50	47	6	207	12
Bone Bone	83	0	78	9	1,531	17
Wotu	165	24	78	28	1,245	21
Mangkutana	296	13	47	13	1,422	17
Malili	48	21	-	-	131	29
Nuha	2	50	-	-	26	27
Total	1,081	14	865	8	15,681	29

SOURCE: Dinas Pertanian.

the area planted. These represented significant losses since hectares planted in Kecamatans Limbong and Bajo totalled 3,548 and 1,547 respectively. Overall the loss for the Kabupaten was 4,547 hectares of crop planted.

The reasons for these quite significant losses have not been determined statistically. Opinions of Camats fall into these categories.

a. destruction by wild pigs

b. destruction by other pests

c. destruction by untended livestock

d. failure because of too much or too little rainfall

No doubt all of these are contributing factors. Wild pigs are reputed to be particularly fond of cassava which may contribute to the high loss factor for this crop. In addition, some of the mountainous Kecamatans such as Limbong where these animals are more numerous have high losses. The other reasons are also no doubt factors contributing to the losses.

Production of these crops is relatively small. Shown below the quantities harvested in tons in 1980 and 1981 compared to those produced in all of South Sulawesi.

		000 Tons		
		Luwu	South Sulawesi	Luwu as Percentage of Province in 1980
Maize	1980	3.1	389.1	0.8
	1981	4.8		1.2
Soybeans	1980	1.6	12.8	12.5
	1981	1.3		10.2
Cassava	1980	2.7	261.6	1.0
	1981	11.7		4.4
Sweet Potatoes	1980	4.0	63.9	6.3
	1981	2.9		4.5
Peanuts	1980	1.8	30.3	5.9
	1981	0.5		1.6
Mung Beans	1980	0.2	46.3	0.4
	1981	0.5		1.1

There is the probability that farmers will increase their production of these crops especially as irrigated land is expanded. The high losses in this area and the possibility that the benefits achieved relative to cost entailed by reducing the loss rates would be quite favorable, suggests that a study should be undertaken to determine what actions to correct the problems can then be taken. These actions might include credit for farmers to purchase fences, poisons or other pesticides. The farmers now reportedly believe that a priority should be given to rice when limited funds are available for pesticides.

The important maize producers among the Kecamatans in 1981 were Bupon, Limbong and Bastem. Kecamatans Suli, Wotu and Malangke are leaders in soybeans production.

Kecamatans Bone Bone and Wotu together produce 57 percent of the cassava while Kecamatans Bone Bone, Bastem, Walenrang and Sabbang produce over half of the sweet potatoes (see table 5.34).

Yields per hectare which are shown in table 5.35 are quite comparable to those of South Sulawesi except in the cases of cassava and sweet potatoes. Yields in the Province as a whole are somewhat higher for these crops. Yields by Kecamatan in 1981 are shown in table 5.36.

The potential for growth of field crops in Luwu has hardly begun to be exploited. Use of sawah for these crops during the dry season especially in areas where there is insufficient irrigation water available for rice cultivation should be an area of investigation by government. If

TABLE 5.33

PRODUCTION OF FIELD CROPS BY YEAR

Tons

	Maize	Soybeans	Cassava	Sweet Potatoes	Peanuts	Mung Beans
1974	2,128	2,087	14,693	4,833	282	115
1975	2,125	1,467	12,533	4,636	545	125
1976	1,270	985	7,367	3,489	419	50
1977	1,908	1,377	9,296	4,770	776	168
1978	3,500	1,954	8,598	3,517	1,256	93
1979	2,466	3,176	7,620	4,126	1,472	195
1980	3,088	1,646	2,669	3,983	1,868	220
1981	4,806	1,333	11,706	2,894	507	508

SOURCE: Dinas Pertanian.

TABLE 5.34

PRODUCTION OF FIELD CROPS BY KECAMATAN IN 1981

Tons

	Maize	Percent of Total	Soybeans	Percent of Total	Cassava	Percent of Total
Larompong	37	1	2	a	242	2
Suli	45	1	364	27	70	1
Bajo	581	12	-	-	54	a
Bastem	706	15	104	8	750	6
Bupon	1,608	33	-	-	730	6
Wara	23	a	121	9	121	1
Walenrang	158	3	55	4	326	3
Sabbang	38	1	-	-	334	3
Limbong	904	19	60	5	231	2
Masamba	39	1	28	2	1,076	9
Malangke	37	1	231	17	142	1
Bone Bone	323	7	127	10	3,861	33
Wotu	110	2	241	18	2,756	24
Mangkutana	163	3	-	-	894	8
Malili	30	1	-	-	94	1
Nuha	4	a	-	-	26	a
Total	4,806	100	1,333	100	11,707	100

	Sweet Potatoes	Percent of Total	Peanuts	Percent of Total	Mung Beans	Percent of Total
Larompong	122	4	20	4	1	a
Suli	24	1	6	1	10	2
Bajo	16	a	4	1	152	30
Bastem	435	15	44	9	-	-
Bupon	206	7	111	22	141	28
Wara	78	3	16	3	-	-
Walenrang	367	13	32	6	10	2
Sabbang	352	12	34	7	45	9
Limbong	44	2	-	-	-	-
Masamba	266	9	24	5	14	3
Malangke	82	3	1	a)	32	6
Bone Bone	422	14	64	13	46	9
Wotu	238	8	32	6	33	6
Mangkutana	211	7	87	17	24	5
Malili	15	1	31	6	-	-
Nuha	16	1	1	a)	-	-
Total	2,894	100	507	100	508	100

SOURCE: Dinas Pertanian.
a less than 0.5 percent.

TABLE 5.35

YIELDS PER HECTARE HARVESTED OF FIELD CROPS BY YEAR IN KABUPATEN LUWU AND SOUTH SULAWESI

Tons

	Maize		Soybeans		Cassava	
	Luwu	South Sulawesi	Luwu	South Sulawesi	Luwu	South Sulawesi
1974	0.5		0.7		6.3	
1975	0.6		0.6		5.6	
1976	0.6		0.6		5.4	
1977	0.6	0.7	0.7	0.6	5.8	7.0
1978	0.8	0.8	0.7	0.7	5.1	7.2
1979	0.7	0.7	0.7	0.5	4.3	7.0
1980	0.8	0.8	0.7	0.7	5.6	7.6
1981	0.9		0.7		6.6	

	Sweet Potatoes		Peanuts		Mung Beans	
	Luwu	South Sulawesi	Luwu	South Sulawesi	Luwu	South Sulawesi
1974	4.2		0.5		0.4	
1975	4.1		0.6		0.4	
1976	4.1		0.7		0.4	
1977	4.5	4.7	0.6	0.6	0.5	0.5
1978	4.2	5.1	0.7	0.6	0.6	0.6
1979	4.3	5.5	0.7	0.6	0.6	0.6
1980	4.6	5.7	0.6	0.7	0.6	0.7
1981	4.3		0.5		0.7	

SOURCE: Dinas Pertanian.

feasible, the process of education of farmers in this area of activity should be a matter of first priority.

5.4.13. Estate Crops

The term estate crops applies to the products of coconut, clove, nutmeg, kapok, pepper, cocoa, cashew, tobacco and candlenut. These are grown by many small

TABLE 5.36

YIELDS PER HECTARE HARVESTED OF FIELD CROPS BY KECAMATAN IN 1981 AND FOR ALL OF SOUTH SULAWESI IN 1980

Tons

	Maize	Soybeans	Cassava	Sweet Potatoes	Peanuts	Mung Beans
Larompong	0.7	-	0.1	4.2	0.7	0.4
Suli	1.8	0.5	3.9	2.0	0.5	0.5
Bajo	1.5	0.9	5.0	3.2	0.5	0.7
Bastem	0.9	-	4.8	3.8	0.7	-
Bupon	1.2	0.9	4.4	4.0	0.8	0.9
Wara	0.8	-	4.0	4.1	0.8	-
Walenrang	1.3	0.6	5.9	5.3	0.6	0.5
Sabbang	0.5	0.7	5.2	5.0	0.5	0.6
Limbong	0.6	-	4.4	2.4	-	-
Masamba	0.8	0.7	5.8	5.2	0.7	0.6
Malangke	0.8	0.7	4.3	4.8	0.6	0.7
Bone Bone	0.9	0.8	9.1	8.9	0.8	0.7
Wotu	0.6	0.6	8.5	2.5	0.3	0.6
Mangkutana	0.7	0.7	4.5	2.8	0.3	0.6
Malili	0.9	-	4.9	5.0	0.8	-
Nuha	0.5	-	4.3	3.3	0.4	-
Total	0.9	0.7	6.6	4.3	0.5	0.7
South Sulawesi						
1977	0.7	0.6	7.0	4.7	0.6	0.5
1978	0.8	0.7	7.2	5.1	0.6	0.6
1979	0.7	0.5	7.0	5.5	0.6	0.6
1980	0.8	0.7	7.6	5.7	0.7	0.6

SOURCE: Dinas Pertanian.

farmers, often in the farmstead. There are plantations where these are grown as well. Hectares devoted to these crops in plantations were estimated to total 55 thousand in 1980 (see ~~section~~ table 3.7).

Statistics concerning estate crop production vary considerably from year-to-year suggesting they are not too reliable. It has been estimated by the BAPPEDA, Kabupaten Luwu that the value of the crop in 1980 was Rp 2.1 million.

More important than the past production of these crops is the outlook for the future. Several coconut plantations are being proposed with at least one already started. A hybrid coconut seed farm of 300 hectares is now in operation near Bone Bone. This supplies the plantations being developed. Seeds are also exported to other parts of the country.

Palm oil plantations are to be developed in Kecamatans Masamba and Wotu. A nursery at Masamba now has 87,213 seedlings being grown. These will be planted in April 1983 in the first 500 hectares of proposed 11,000 hectare and 5,000 hectare plantations in Kecamatans Masamba and Wotu respectively. From 1,500 to 2,000 hectares will be planted annually. Oil factories are being proposed at both sites with employment of perhaps 300 workers in each. The oil palms begin bearing in about 30 months after transplanting. The project is being undertaken by a government company with World Bank support.

Based upon observation, growing of clove is being expanded rapidly. This is having some negative side effects such as erosion and the utilization of animal pasture.

From this, it is apparent that the prospects for increases in expansion of improved variety estate crops are promising.

5.4.14. Livestock

The number of livestock and poultry has been increasing steadily during recent years. Shown below are the numbers by type for the years 1976 and 1981.[1]

	Thousand	
	1976	1981
Horses	0.9	2.2
Water Buffalo	21.2	30.1
Cattle	21.5	44.5
Goats	6.2	12.9
Swine	12.0	26.9
Chickens	361.9	706.8
Ducks	51.4	125.6

Total value of production at farmgate prices in 1980 was Rp. 9.9 million.[2]

5.5. Industry

The development of an industrial sector has not proceeded far in Kabupaten Luwu. The most common type of industry besides the cottage industry type activity is the processing of wood to make wood products. The number of sawmills is discussed in section 5.13. In addition to this, there is a plywood factory located south of Palopo in

[1] BAPPEDA, Kabupaten Luwu.
[2] Ibid.

Kecamatan Bupon. The only other major industry is the nickel smelting in Kecamatan Nuha (section 5.2.1.).

The plywood factory is owned by the Army and is managed by a private company. It was located near Palopo to provide jobs. It was established 10 years ago but ceased to operate after two years. Operations began again in 1978.

The capacity of the plant is 5,000 pieces of plywood per day. These are 122 centimeters wide and 548 centimeters long with the thickness varying from 4-18 millimeters. Production is distributed among the following markets:

5 percent Kabupaten Luwu

85 percent South Sulawesi

10 percent exported to Hong Kong and Singapore

Raw materials in the form of logs are imported from Luwu (10 percent) and the Maluku archipelago (80 percent).

The reasons for the predominance of the import from the Maluku are (1) price is lower, and (2) type of wood. Local wood is used for the inner sheet of the plywood. The amount of wood used is 4,000 cubic meters per month. It is brought to the plant in barges with loads of 2,000-3,000 cubic meters.

The plant employs 640 workers for three shifts six days per week. Half of the workers are female. Unskilled labor earns a wage rate of Rp. 600 for a 7 hour shift. Training requirements are minimal comprising only one week.

The firm plans an expansion to produce mouldings. This will require 20 additional personnel.

5.5.1. Other

Except for rice hulling, a soybean curd factory, coconut oil plant, bakeries, clove oil extraction, and local abattoirs, there is no food or agricultural processing. A number of kecamatans are sites of brick manufacturing plants.

Two palm oil processing plants are proposed in the near future. They will process palm oil nuts from two plantations in Kecamatans Mamamba and Wotu. The first is proposed to be installed in 1984 (see section 5.4.13). A coconut oil plant is proposed in Kecamatan Bajo.

5.5.2. Future Industry

The potential for the development of industry in the Kabupaten needs to be reviewed. This study should determine which industries might be feasible, the locations of industrial areas to be developed, and actions such as provision of industrial parks, as well as local government policies which might be developed.

6. Physical Infrastructure

The physical infrastructure is composed of the subsectors of communications, transportation, electric power, and municipal services. As noted in the following paragraphs, these facilities are nonexistent or wholly inadequate in Kabupaten Luwu. Lack of adequate access to markets and supplies is an unmeasured but obvious impediment to development of the agriculture in the area. Improvements in transportation and communications should be matters of high priority in the development program.

6.1. Communications

6.1.1. Telephone and Telegraph

The Post and Telegraph organization is a government-owned company providing these services to Palopo. The remainder of the Kabupaten does not have telephone or telegraph services.

At present Palopo has 220 telephone lines using magneto instruments. The exchange has capacity for an additional 180 lines which are expected to be installed by year-end. In 1983, it is also expected that a semiautomatic exchange with 600 line capacity will replace the system now in existence.

Long distance service is provided by an earth station which utilizes the domestic satellite. The earth station became operative in May 1982.

The telephone and telegraph company employs 36 personnel.

There are no plans at present to expand the telephone and telegraph system to areas outside of Palopo in Kabupaten Luwu. In the meantime, government organizations will continue use private radio systems for speedy communications.

6.1.2. Television

There are two television stations in Kabupaten Luwu. One is located in Palopo and the other is privately owned and serves the mining facility in Kecamatan Nuha and surrounding areas.

Both stations are repeaters of programming from Jakarta. The station in Palopo has an operating strength of 100 kilowatts and operating hours are 1730 to 2400 daily.

The station in Palopo began operation on May 28, 1982. On October 14, 1982 there were 333 licensed receivers in operation of which 212 could receive color broadcasts. Licenses generally cost Rp. 3,000 per year for color units and Rp. 2,000 for black and white with some differences due to size of screen of receivers.

The absence of local programming precludes the use of television for education in areas of interest peculiar to Kabupaten Luwu. It is possible that this could be a relatively inexpensive method of educating cultivators about

improved methods of agriculture. This would, of course, necessitate the expansion of television broadcasting to other areas of Luwu.

Of note is the emphasis that several Camats placed on television as being needed for their areas. Reasons cited were political/Social nature.

6.2. Transportation

6.2.1. Ports

There is only one developed port in Kabupaten Luwu. This port, at Palopo, has only rudimentary facilities which consist of a causeway over tidal flats and a pier. There is a lighterage port at Malili operated by P.T. INCO which is used to export semi-processed ore and import supplies required by the mining operation located in Kecamatan Nuha. Logs and lumber are exported from various undeveloped ports in the Kabupaten.[1]

Cargo traffic in Luwu, especially cargo unloaded has increased very substantially the past four years. During 1981, 313 small vessels and 158 boats called at the ports in all of Luwu. Throughput was approximately 53,000 tons in 1981 of which 2,500 tons were related to road construction in the Kabupaten. In addition, there were 6,106 arriving and 2,265 departing passengers. Shown below, are the

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[1]The source of information concerning ports is the Departemen Perhubungan Direktorat Jeneral Perhubungan Laut Kantor Wilayah VI Kesyahbandaran Palopo.

	Tonnage (000)		Passengers (000)	
	Unloading	Lbading	Arriving	Departing
1973	3.1	11.0	2.2	2.2
1974	2.1	5.7	2.9	2.6
1975	2.3	6.0	11.7	13.2
1976	3.6	19.1	16.1	24.0
1977	6.0	20.2	21.7	27.0
1978	15.2	16.4	26.2	24.8
1979	24.5	15.8	18.8	22.2
1980	28.7	14.7	15.3	18.6
1981	40.1	12.8	6.1	2.3

Shown above are the tonnage of throughput and passenger traffic per year for all ports and anchorages of the Kabupaten.

The foregoing statistics for tonnage of throughput are approximate since data are not segregated between cubic meters and tonnage. Volume or tons are interchangeably recorded depending upon the type of cargo. Since a cubic meter of wood weighs about one ton, the terms have been assumed to approximate tonnage, the usual measure for throughput.

Passenger traffic declined markedly in 1981 due to improvements in surface transport facilities. The same is likely to occur to freight traffic when the road to Ujung Pandang is improved and the road to Malili is completed.

There are two improvement projects proposed for the port at Palopo. The first is relatively minor and consists of dredging around the pier. At present, vessels of 2,300 tons deadweight can be accommodated at the 80 meters of berthing space. If the area around the pier is dredged to a

depth of 4 meters at low tide, a vessel of 3,000 tons can be accommodated.

There is a problem of silting. About two centimeters of silt per year are deposited in the harbor from the river. It is believed the denuding of the watershed to permit clove production has exacerbated an already existing problem. Rubbish discarded in the river by the residents of Palopo is also a problem.

Another proposal is to increase the length of the pier to 400-500 meters and dredge to a depth of 13 meters. This would permit ships of 5,000 tons deadweight to use the port. This proposal anticipates the economic development of Kabupaten Luwu including copper mining on the border between Kabupatens Tana Toraja and Luwu.

The government proposes to develop the port of Siwa south of Larompong. If this is done and with the completion of improvement of the road to the south, the transport needs of South Luwu should be adequately served for the near future.

The port of Palopo seems adequate to serve the needs of central Luwu including throughput of the proposed petroleum products depot for some time into the future. It seems the throughput capacity of the port might be 100,000 to 125,000 tons per year. If any and considering the probable diverted traffic to roads, the port with the minor dredging proposed should be adequate for the intermediate term.

About the only other site for a port along the coastline of Kabupaten Luwu which does not require extensive dredging is along the coast of Kecamatan Bone Bone. A site in this area at Munte is being proposed for development. Whether this will prove to be a feasible proposition can only be determined after study.

A study of the whole maritime requirements of the Kabupaten and their relationship to other ports being developed to the south should be undertaken before serious consideration is given to any expansion of the port facilities in Luwu. It may be that the development of oil palm plantations and other productive facilities previously noted will require such facilities. This can only be ascertained however by serious study.

6.2.2. Roads

The backbone road from the border of Kabupaten Wajo to Kecamatan Malili will be completed in 1983. An asphalt surfaced road connecting Palopo and Kabupaten Tana Toraja is already in place. These links provide the Kabupaten with all-weather, if not speedy, links to Pare Pare and Ujung Pandang.

The intraKabupaten roads are rudimentary at best. Three of the Kecamatans--Bastem, Limbong, and Malangke--are not linked to the rest of the Kabupaten by roads which can accommodate four-wheel vehicles. Many feeder roads are

little more than foot paths. Bridges are lacking which exacerbates the problems of movement of people and goods.

The task of road development should be high on the list of priorities of works to be undertaken. The present status of the roads and what to do has recently been the subject of study as part of the Project Luwu programs. This and the status of construction of the backbone route are discussed in section 10.1.

6.3. Electricity

6.3.1. Customers

Palopo is served by Perusahaan Umum Listrik Negara (PLN) which is a government-owned company. In October 1982 the company served 4,252 customers. As shown below, most were residential.

Residential	3,690
Commercial	408
Government	93
Other	61
Total	4,252

According to company forecasts, the number of customers served will imcrease to 5,200 in 1983 and 6,500 in 1984.

6.3.2. Capacity

The company had 1,655 kilowatts of generating capacity in October 1982 according to the nameplate ratings of the 5 generators in use. Some of the generators are older and

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[1]Data in this section were obtained by interview with the Manager, PLN, Palopo.

will not produce the amount shown on the nameplate. The derated capacity, or what they will actually produce, is 1,520 kilowatts. Firm capacity, or total capacity less the kilowatts represented by the largest generator, is thus 1,155 kilowatts. This compares with a peak load of 1,350 kilowatts in October 1982. Therefore, there is adequate capacity in the near term so long as the largest generator of 500 kilowatts capacity continues to function properly.

The company expects to add 500 kilowatts of generating capacity in late 1982 and 3,500 kilowatts in 1983-1984. This should provide adequate capacity for those periods.

6.3.3. Generation

Generation totalled 3.1 million kilowatt hours in 1980-1981 and 4.2 million in 1981-1982. Metered sales were 2.5 million kilowatt hours and 3.4 million kilowatt hours for the same two years. This indicates that line losses were 19 percent of generation for both years. This seems higher than it should be for an urban system and indicates that the transmission and distribution systems are not top quality. This conclusion is confirmed by observation. The observed quality of service is poor. Large geographical areas have low voltage accompanied by numerous interruptions of service--often several times a day.

6.3.4. Voltage and Cycles

Voltages and cycles conform to the standard of the nation at 50 kertz with primary distribution at 6 KV and

20 KV. Service is provided to customers at 220/380 volts. The original distribution system is still in use and service is provided there at 110/220 volts. There are no plans at present to unify the system. Expansions, however, will be at 220/380 volts.

6.3.5. Rates

Rates are those of the nation as a whole and are well designed for an area such as Kabupaten Luwu. Small use customers pay a lower rate per unit than larger use customers. There is also a surcharge on non-residential customers for consumption during peak load periods.

This type of rate structure uses the price mechanism to discourage usage that adds to capacity requirements. In addition, the benefits of electric power are provided to low income users at a lower rate. At the same time, the lower cost from returns to scale is recognized by providing a lower per unit cost for larger industrial users. Shown below are the charges and structure of the system of rates used.

	Rupiah per KWH
Residential	
Simple low quantity users	37.5
Small quantity users	45.5
Medium quantity users	63.5
Large quantity users	79.5

	Rupiah per KWH
Commercial	
Small quantity users	66.0
Medium quantity users	70.0
Large quantity users (1800 hours to 2000 hours)	74.0
Large quantity users (2000 hours to 1800 hours)	46.5
Hotels	
Low voltage (110/220 V 220/380 V)	54.5
High voltage (6 KV and 20 KV)	38.5
Industrial	
Small quantity users (1800 hours to 2200 hours)	49.0
Small quantity users (2200 hours to 1800 hours)	30.5
Medium quantity users (1800 hours to 2200 hours)	46.5
Medium quantity users (2200 hours to 1800 hours)	29.0
Large quantity users (1800 hours to 2200 hours)	44.0
Large quantity users (2200 hours to 1800 hours)	27.5
Large quantity users (6 KV and 20 KV)	40.0
Government	
110/220 V 220/380 V	46.0
6 KV and 20 KV	30.0
Street lighting	40.0

6.3.6. Rural Electrification

The villages and towns are being electrified at a rapid rate. This is being done by the private sector as well as by PLN and the rural electrification program discussed in section 10.7. Some of the installations by the private sector are reported in interviews with the Camats to be in

poor condition after only two years of operation. This indicates there should be some organization responsible to oversee and assist the private sector provide electricfication.

6.3.7. Nuha Mining Complex

By far the largest producer and user of electric power is the company engaged in nickel mining in Kecamatan Nuha. This company has three hydro generation units of 65 megawatts capacity each making total capacity 195 megawatts. In addition, the company has two thermal generating units of 28 megawatts each in mothballs. These units are for sale. They were in service prior to completion of the hydro generating complex.

The three hydro units utilize all the available water and are scaled to provide power required for the three electric furnaces when the smelters are operating at full capacity of 45.5 million kilograms of matte per year. Because of the present worldwide economic difficulties, the smelters are operating much below capacity. The annual peak was 90 megawatts in 1981 and was 70 megawatts in October 1982. These figures are far below the capacity of 195 megawatts capacity cited previously[1].

[1]Interview with Assistant Vice President, P.T. INCO, Soroako, November 3, 1982.

Actual generation was 787 million kilowatt hours in 1981 and 507 million kilowatt hours during the first 10 months of 1982. Plant factor which is the percentage actual output comprises of potential output was 46 in 1981 and 36 in the first 10 months of 1982. If the smelters were operating at full capacity, for example, plant factor of the generating system would be close to 100.

The generation is at 50 cycles and 25 cycles and conforms to the standards of the nation.

6.3.8. Other Major Generation Proposed

According to information from the Camat, Kecamatan Malili[1], plans are underway to develop additional generation in that kecamatan. This will be hydro generation using water from Lake Towuti with the generating facility being located downstream on the Larona River. The power generated is proposed to be used for a nickel mine and smelting operation of P.T. Aneka Tambang at Pomalaa in Southeast Sulawesi.

6.3.9. Long Term Considerations

The electrical program is expanding rapidly and needs to be coordinated and developed in a coherent manner. It is not too soon to develop an overall plan for the Kabupaten that considers the long-term possibility of interconnecting

[1]Interview November 8, 1982.

with the INCO system in the north and Pare Pare in the south. Consideration should also be given to assigning part of the capacity of the proposed facility in Malili to Luwu if it actually develops. Only through this type of long-term planning can the mistakes of the other areas be avoided. The responsibility for this effort is too wide in scope to be a task of the Kabupaten planning effort alone.

6.4. Municipal Services

6.4.1. Potable Water

Potable water for Palopo is provided by the Ministry of Public Works by diversion of the Mangkaluku River. Minimun flow of this stream is 120 liters per second. This amount of flow is adequate to serve Palopo to 1985. Plans have not been formulated yet concerning an additional source of water. Another undeveloped river in the area is available however.

Water service is often interrupted. This is due to the large amounts of mud, leaves and other debris which wash down from the watershed area of the adjacent hillsides during rainstorms. This requires the intake from the stream to be flushed out. The problem of erosion has been exacerbated by farmers clearing hillsides to plant cloves or similar crops. A government order was recently promulgated barring the use of land in an area 100 meters from the stream for 10 kilometers along it. According to the authorities, this is not being enforced.

As of July 1982, filtered and treated water was provided to a distribution network[1] comprising 1,773 connections and 18 public hydrants. This amounts to service to an estimated 30-40 percent of the population of the city. This will be expanded to 50 percent of the population in 1982-83 or 2,500 connections. Average water consumption is low being 60 liters per capita per day in the areas where service is provided.

Revenues from the service are not sufficient to pay operation and maintenance expenses. The organization has 24 employees[1].

6.4.2. Housing

Housing in the Kabupaten is typical in construction to that in other parts of South Sulawesi. It is for the most part privately-owned. Housing for employees of a certain level is provided by government agencies both for project and administrative and technical personnel.

Qualifying individuals can secure loans from the Bank Tabungan Negara (BTN) to construct houses. These loans are for amounts ranging from Rp. 4.5 million to Rp. 8.0 million. Repayment periods extend from 15 to 20 years. About 400 homes have been built in Palopo under this program.

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[1] Interview with Manager, Badan Pengelola Air Minum, Palopo.

Perumnas which is an agency under the Menteri Muda Urusan Perumahan (Ministry of Housing) constructs housing units for sale to individuals. Three types of homes are constructed. The largest and most costly are reserved for sale to government servants. Others can be sold to any individual not already owning a home. Contractors building the homes can receive interim financing from the BTN. Buyers can purchase the home repaying the cost over an extended period. Monthly payments range from Rp. 7,500 to Rp. 10,000 per month. As of March 1983, 852 dwelling units will have been completed under the program.

A pilot project has been undertaken by BANDES to provide credit for about 10 houses per desa throughout the Kabupaten. These are inexpensive demonstrative type houses with the cost to be repaid in one year. If successful, the program could be expanded to meet rural housing needs[1].

6.4.3. Urban Planning and Development

Kecamatan Wara is following an urban plan prepared by Departemen Pekerjaan Umum (Department of Public Works). The plan which was completed December 31, 1981 covers the period to 1999. The Camat does not expect to need further planning of this nature[2].

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[1]Interview with Camat, Kecamatan Wara, November 23, 1982.

[2]Ibid.

The plan delineates housing, commercial, and industrial areas. Each of the 11 desa chiefs ensures that the plan is followed through the issuance of building permits.

7.0. Social Infrastructure

The social infrastructure which for the most part includes education and health care is being expanded rapidly. Together these services received 14 percent of the development budget in 1981-1982.

7.1 Education

The Department of Education has the responsibility of providing the basic educational needs of the school age population. There are at present some desas and kecamatans which do not have certain levels of schools available, and of those facilities that are available, the classrooms are overcrowded because of insufficient classrooms, teachers or both.

7.1.1. Enrollment

There are three types of schools. The ordinary schools, those provided under the President's Inpres program, and those provided by the private sector[1]. Private sector schools account for 7 percent of total enrollment in schools from primary through the high school levels. Privately-owned schools at the upper levels have a much more important role. Twenty-five percent of total high schools in the Kabupaten are privately-owned. This information is shown in table 7.1.

[1]All of the information in this section was provided in unpublished documents by Departemen Pendidikan dan Kebudayaan, Kabupaten Luwu.

TABLE 7.1

PERCENT OF TOTAL ENROLLMENT IN 1981-1982

	Government			
	Ordinary	Presidential Inpres Program	Private	Total
Primary	100	-	-	100
Basic	70	25	5	100
Secondary	89	-	11	100
High School	75	-	25	100
Total	73	20	7	100

SOURCE: Departemen Pendidikan dan Kebudayaan.

Total enrollment at the beginning of 1981-1982 in Kabupaten Luwu was 117,999 students. Of these, 79 percent were in the 6 classes of the basic school systems and 13 percent were in secondary schools. Only 6 percent were in high school. Only 7 of the Kecamatans offered students high school facilities in their own areas. The relatively large number of students attending high schools compared to the number attending secondary schools in Kecamatans Bajo, Wara, Masamba and Malili suggests that students from neighboring areas are attending their high schools. Malangke is the only Kecamatan which does not have a secondary school. Information concerning enrollment by Kecamatan for each type school is shown in table 7.2.

[1]It should be emphasized that all of these date are for the beginning of 1981-1982.

TABLE 7.2

ENROLLMENT BY TYPE OF SCHOOL BY KECAMATAN
AT THE BEGINNING OF 1981-1982

	Primary	Basic	Secondary	High School	Total	Percent of Total
Larompong	27	3,164	519	-	3,710	3
Suli	30	2,907	614	-	3,551	3
Bajo	89	6,740	1,157	756	8,742	7
Bastem	-	2,532	225	-	2,757	2
Bupon	86	8,610	1,250	-	9,946	9
Wara	577	10,453	3,846	5,035	19,911	17
Walenrang	26	13,051	2,445	156	15,678	13
Sabbang	45	5,954	742	151	6,892	6
Limbong	-	1,898	174	-	2,072	2
Masamba	55	5,106	844	460	6,465	6
Malangke	26	2,850	-	-	2,876	2
Bone Bone	286	9,094	1,179	-	10,559	9
Wotu	35	5,328	451	55	5,869	5
Mangkutana	301	6,893	934	-	8,128	7
Malili	50	3,513	530	546	4,639	4
Nuha	537	4,865	802	-	6,204	5
Total	2,170	92,958	15,712	7,159	117,999	100
Percent of Total	2	79	13	6	100	

SOURCE: Departemen Pandidikan dan Kebudayaan.

7.1.2. Tuition and Other Attendance Requirements

Children must be six years old to enroll in the basic school system. Tests are given prior to enrollment in secondary or high schools. The number of students allowed to enroll depends upon the availability of classroom space.

Tuition is charged in government as well as private school. Fees vary by area and by the parents' ability to pay[1]. A minimum of Rp. 10,500 per year per student is charged for primary in Palopo while the fee for basic school is Rp. 7,500 per year. Secondary and high school fees are:

Category A	Rp. 300 - 500 per month
Category B	Rp. 250 - 300 per month
Category C	Rp. 150 - 250 per month

The category of fee depends upon parents' income. In addition, special fees are assessed for special activities in secondary and high school.

7.1.3. Schools Compared to School Age Population

A comparison of the number of children enrolled at each school level, i.e., primary, basic, secondary and high school, and the populations for the corresponding ages indicates that 58 percent of the children are enrolled in school. This information is shown on the following page.

[1]It should be noted that prents must provide school furniture for their children in some kecamatans.

TABLE 7.3

PERCENT OF SCHOOL AGE POPULATION ENROLLED

Primary	4
Basic	96
Secondary	51
High School	28
Total	58

SOURCE: Departemen Pendidikan dan Kebudayaan.

TABLE 7.4

INDICATED NUMBER OF SCHOOL AGE CHILDREN NOT ENROLLED AT THE BEGINNING OF 1981-1982

Primary	47,500
Basic	4,000
Secondary	15,000
High School	18,500
Total	85,000

SOURCE: Departemen Pendidikan dan Kebudayaan.

These data indicate that the school system is not providing a complete education to 85,000 school age children in Luwu. This is shown in the table 7.4.

Data concerning population were taken from the 1980 census of population and were shifted to correspond to school ages in 1981-1982, e.g., population for ages 4, 5 and 6 in 1980 were assumed to correspond with grades 1, 2 and 3 in primary school in 1981-1982. Therefore, they are only approximate. Nonetheless, they are sufficiently indicative to show that the educational effort in Luwu requires considerable enhancement.

There is considerable variation in the participation in the educational program among the Kecamatans. In Malangke, where only one primary school and the 6 grades of the basic school system are offered, 42 percent of the school age population was enrolled at the beginning of 1981-1982. Kecamatans Larompong and Bone Bone also had relatively low educational participation rates with percentages of 46 and 48 respectively. While a high school was not available in either place, participation rates in the other types of education facilities were generally low as well. Kecamatan Bone Bone, however, recorded one of the highest rates of attendance in primary school (see table 7.5).

The highest participation rates were in Kecamatan Wara with 81 percent of the school age population in school, Kecamatan Malili with 73 percent, Kecamatan Masamba with 65 percent and Kecamatans Bajo and Nuha with 62 percent each. Kecamatan Wara is an urban area with more accessability to educational facilities which no doubt contributes to the higher participation rates. It also has more facilities available.

Although the school age population is lower than that of Kecamatan Walenrang (24,500 compared to 28,800) Kecamatan Wara has 14 high schools and 10 secondary schools compared to 1 and 3 for Kecamatan Walenrang. It's probable that students from the hinterland come to Kecamatan Wara to take

TABLE 7.5

PERCENTAGE OF SCHOOL AGE POPULATION ENROLLED BY TYPE OF SCHOOL AT THE BEGINNING OF 1981-1982

	Primary	Basic	Secondary	High School	Total
Larompong	1	86	45	-	46
Suli	2	87	70	-	54
Bajo	4	72	97	46	62
Bastem	-	96	37	-	50
Bupon	2	97	39	-	52
Wara	11	106	85	108	81
Walenrang	a	97	52	5	54
Sabbang	2	92	49	13	60
Limbong	-	108	25	-	51
Masamba	2	110	54	36	65
Malangke	1	97	-	-	42
Bone Bone	6	79	38	-	48
Wotu	1	103	27	4	54
Mangkutana	7	106	38	-	55
Malili	3	124	65	61	73
Nuha	20	117	53	-	62
Total	4	96	51	28	58

SOURCE: Kantor Departemen Pendidikan dan Kebydayaan.
a less than 0.5 percent.

advantage of the facilities which may not be available or are considered inferior in their areas.

It is noteworthy that school enrollment in the basic schools exceeds the indicated school age population in some cases. This no doubt stems from the fact that basic schools have not always been available in certain locations in the past. This created a backlog of students who, together with those of the appropriate age group, are now enrolled.

The foregoing data represent an example of the poor distribution of educational facilities and other facilities in developing areas. Two distinct problems emerge from this. First, the people in the hinterland are disadvantaged and secondly, the movement to urban centers is accentuated resulting in the necessity for increased investments in social overhead, i.e., the social and physical infrastructure in the urban areas. Thus, a policy to provide facilities in the hinterland equal to those in the urban centers is usually desirable.

7.1.4. Geographical Distribution of Schools

There is considerable variation in the potential enrollment per school among the Kecamatans. This can easily be seen in the third column of table 7.6. Kecamatan Walenrang is poorest served by government schools as measured by population per school.

TABLE 7.6

NUMBER OF GOVERNMENT SCHOOLS[a], SCHOOL AGE POPU[illegible]ER SCHOOL AND INDEX OF POPULATION PER SCHOOL BY K[illegible]TAN

	No. of Government Schools	Population Per School	Index of Population Per School
Larompong	15	540	111
Suli	16	407	84
Bajo	30	471	97
Bastem	14	392	80
Bupon	29	424	87
Wara	49	499	102
Walenrang	37	779	160
Sabbang	23	496	102
Limbong	18	225	46
Masamba	26	380	78
Malangke	17	399	82
Bone Bone	39	564	116
Wotu	22	498	102
Mangkutana	21	698	143
Malili	16	398	82
Nuha	16	628	129
Average	388	487	100

SOURCE: Kantor Departemen Pendidikan dan Kebudayaan.
a Includes primary, basic, secondary and high school.

Schools vary in size and their number may vary with population density. Therefore a better measure of how well the government is serving the educational needs of the school age children in a physical sense is the number of classrooms provided.

Based upon potential students per classroom, Kecamatans Walenrang, Bupon, Mangkutana, and Bastem have the fewest classrooms relative to school age population.

Masamba, Malili and Suli have the greatest number of classrooms relative to school age population.

The inclusion of private schools does not change the relative distribution of classrooms to a significant degree. In fact, the standard deviation, which measures the dispersion from the mean is 21 in the case of government schools only and 20 for all schools. This means that 68 percent of the Kecamatans have an index of school age population per classroom between 79 and 121 when government schools only are considered and an index between 80 and 120 when all schools are considered. These ranges seem high for an area with an expanding school system. This suggests that if school age population in an area is a consideration in determining the location of schools, the results to date have not been noteworthy.

Basic schools classrooms relative to population are even more widely dispersed. Secondary schools show a very wide dispersion. There may be valid reasons for the wide dispersion in the case of secondary schools, i.e., there is no need for a secondary school if there are few students who have been through basic school. This reasoning does not apply to the basic school systems.

In general, there appears to be little or no coordination between government and the private sector in the case of the establishment of schools in the Kecamatans.

This is particularly true for basic schools where the deviation among the Kecamatans in population of school age children per classroom is greater for both government and private schools combined than it is for government schools only (see table 7.7).

In the case of secondary schools, however, it does appear that either the government is establishing schools with consideration for where private ones are already established or vice versa. Most likely the private sector is responsible for filling the gaps in the school system. In any event, the dispersion in school age population per classroom is less when private schools are included. A wide disparity in population per classroom still remains, however.

A better measure of the coverage of the Kabupaten with educational facilities is the facilities available in each desa or in the case of Kecamatans Masamba, Wotu and Mangkutana in each village. This information which is shown in table 7.8 is available from questionnaires submitted from each and are for 1980. Therefore the present situation may vary slightly from the information shown.

Based upon the information submitted, 27 of the 156 desa (or villages) had primary schools available in 1980 or to put this another way, 129 did not have a primary school; 19 did not have a basic school; 115 did not have a secondary school; and 144 did not have a high school.

TABLE 7.7

INDEX OF SCHOOL AGE POPULATION
PER CLASSROOM BY KECAMATAN

	All Classrooms		Basic School		Secondary School	
	Gov't	All	Gov't	All	Gov't	All
Larompong	106	111	100	104	90	105
Suli	77	81	83	87	50	58
Bajo	91	93	130	136	43	50
Bastem	116	121	114	119	81	94
Bupon	128	129	118	119	141	164
Wara	96	88	104	102	60	54
Walenrang	132	136	132	136	86	101
Sabbang	91	93	107	107	109	103
Limbong	67	68	58	58	122	142
Masamba	72	76	74	77	80	80
Malangke	96	101	81	85	–	–
Bone Bone	113	116	121	126	95	110
Wotu	91	93	88	87	141	164
Mangkutana	132	121	118	107	226	125
Malili	75	76	74	73	76	74
Nuha	116	98	97	75	100	87
Total	100	100	100	100	100	100
Standard Deviation	21.4	20.4	22	24	45[a]	36[a]

SOURCE: Departemen Pendidikan dan Kebudayaan.
a Does not include Kecamatan Malangke which does not have a secondary school.

TABLE 7.8

NUMBER OF DESAS WITH SCHOOLS
BY TYPE IN 1980

	Desas	Primary		Basic		Secondary		High School	
		Desas With[a]	No. of Schools	Desas With	No. of Schools	Desas With	No. of Schools	Desas With	No. of Schools
Larompong	8	1	1	8	14	1	1	-	-
Suli	7	1	1	7	19	4	5	1	1
Bajo	14	1	1	13	30	4	5	1	1
Bastem	9	1	1	7	9	-	-	-	-
Bupon	12	2	2	11	31	2	4	-	-
Wara	18	4	8	11	43	6	10	5	14
Walenrang	14	2	2	14	42	5	7	1	1
Sabbang	8	1	1	8	27	2	2	-	-
Limbong	9	-	-	8	16	1	1	-	-
Masamba	11[a]	1	1	10	24	4	5	1	1
Malangke	6	1	1	6	21	1	1	-	-
Bone Bone	18	3	5	11	36	3	4	-	-
Wotu	7[a]	3	3	5	29	1	1	1	1
Mangkutana	9[a]	3	3	6	23	3	4	-	-
Malili	5	1	1	4	27	1	1	1	1
Nuha	8	2	3	8	19	3	3	1	1
Total	156	27	33	137	410	41	54	12	21

SOURCE: Developed from questionnaires submitted by desa.
a Villages rather than desas.

The foregoing data further indicate the extent to which the educational facilities do not cover the geographical area of the Kabupaten.

7.1.5. Teachers and Enrollment Per Teacher

School teachers in Kabupaten Luwu number 2,950 for all grade levels from primary througn high school. This figure does not include teachers employed by privately operated schools in the basic school system. There were privately operated basic schools in 8 Kecamatans with a total enrollment of 4,538 students at the beginning of 1981-1982. This would increase the number of teachers by about 50 making the total number of teachers approximately 3,000.

	Number of Teachers
Primary	71
Basic (not including private schools)	1,698
Secondary	692
High School	489
Total	2,950

Most of the teachers employed in the government basic schools are secondary school graduates with one year of teacher training. Few have college degrees. A summary of skill levels of government basic school teachers is shown on the following page.

An analysis of the training level by kecamatan reveals little difference between them. Kecamatan Wara has slightly

	Number of Teachers	Percent of Total
B.A. Degree	57	3
High School plus one year	19	1
Secondary School plus three years of teacher training	1,517	90
Basic School plus one year of teacher training	5	a
Religious School	100	6
Total	1,698	100

a less than 0.5 percent.

better trained teachers due to the higher relative number of teachers with a B.A. Degree. This doubtless stems from the relative ease of recruitment for the Palopo school systems.

In general, teacher/student ratios are satisfactory in the primary, secondary and high schools. The basic school system's ratio is very high by usual standards of teaching environments. Overall the number of students per teacher was 52 in the basic schools. The rate is unsually high in Kecamatan Bone Bone, being 76 students for each teacher. Data for the types of schools by Kecamatan are shown in table 7.9.

7.1.6. Other Programs

Adults who are literate may attend night school to learn cottage industry-type occupations such as sewing, carving or basket weaving. Upon completion of the courses, the school dispenses loans from the Province to the extent of Rp. 150,000 to assist them pursue their new occupation.

TABLE 7.9

ENROLLMENT PER TEACHER AT THE BEGINNING OF 1981-1982
BY KECAMATAN

	Primary	Basic[a]	Secondary Government	Private	Total	Government	Private	Total
Larompong	15	46	19	-	19	-	-	-
Suli	30	41	24	-	24	-	-	-
Bajo	30	45	22	-	22	21	10	17
Bastem	-	45	16	-	16	-	-	-
Bupon	29	55	26	-	26	-	-	-
Wara	25	46	20	14	18	17	12	15
Walenrang	26	63	29	-	29	-	10	10
Sabbang	45	42	25	12	21	-	6	6
Limbong	+	29	13	-	13	-	-	-
Masamba	28	38	28	17	26	19	-	19
Malangke	26	56	-	-	-	-	-	-
Bone Bone	57	76	21	-	21	-	-	-
Wotu	35	67	25	-	25	-	6	6
Mangkutana	31	61	25	16	20	-	-	-
Malili	13	66	23	12	19	18	-	18
Nuha	41	57	33	7	22	-	-	-
Total	30	52	23	13	22	18	10	15

SOURCE: Departemen Pendidikan dan Kebudayaan.
[a]Government schools only.

This program, which is supported by the World Bank, trained 22 groups of 10 members each in 11 of the 16 Kecamatans in 1980-1981. A program of 33 groups is proposed for the current year.

A program to provide literacy training for the 47,000 adults who cannot read and write will be conducted this year.

The foregoing are in addition to the continuing effort to improve and augment the school systems facilities and upgrade the qualifications of the teachers.

7.1.7. Other Educational Facilities

There are four specialized high schools in Luwu. All of them are government operated and all are located in Palopo. Each offers three years of education beyond the secondary level. The number of students enrolled and specialty of each are shown below:

	Enrollment			Specialty
	Male	Female	Total	
Economic	284	463	747	Office work
Agricultural	259	60	319	Agriculture
Technical	436	8	444	Irrigation, Construction, Mechanics
Teachers' Training	122	435	557	Teacher training
Total	1,101	966	2,067	

Three institutions of higher learning also operate in the Kabupaten. These are also located in Palopo. Each offers three years of college level work. All have been in operation since the 1960's. Two are private schools and one is government.

	Enrollment			Operation
	Male	Female	Total	
Institution of Social Policy	317	114	431	Private
Institution of Education	450	210	660	Private
Institution of Moslem religion	87	62	149	Government
Total	854	386	1,240	

7.1.8. Education Budget

The expenditure for education in the development budget in 1981-1982 amounted to Rp. 1.6 billion or 11 percent of total government expenditure for that year. This amounts to Rp. 8,000 per school age person.

The expenditure per school age person in 1981-1982 varied considerably. Based upon an index level of 100 as being the average for the kecamatans, Malili had an expenditure of 291 percent of average and Bastem had no allocation. This is a wider range than would be expected.

TABLE 7.10

DEVELOPMENT BUDGET EXPENDITURE PER SCHOOL AGE PERSON FOR EDUCATION IN 1981-1982

	Expenditure 000	Index
Larompong	10	121
Suli	10	121
Bajo	6	73
Bastem	0	0
Bupon	6	73
Wara	10	121
Walenrang	5	61
Sabbang	10	121
Limbong	5	61
Masamba	9	109
Malangke	8	97
Bone Bone	5	61
Wotu	6	73
Mangkutana	7	85
Malili	24	291
Nuha	11	133
Total	8	100
Luwu unsegregated	a	
Grand total	8	100

SOURCE: Various budget documents.
a less than Rp. 500 per student.

7.2. Health

7.2.1. Coordinated Development Program

The Kabupaten Luwu health development program directly involves the government agencies of Transmigration, Agriculture, Education, Social Affairs and Rural Development. Each department has a project with Rural Development (BANDES) coordinating the whole activity. The specific program of

the Health Department is P2WPK (the women's role and function in health development).[1]

7.2.2. Nutrition

There have been no nutritional studies made in Kabupaten Luwu. Those undertaken in other parts of the country indicate the principal dietary deficiencies are Vitamin A, iron and iodine.

Protein intake of the population is also insufficient. Anemia which may be associated with diet also has a relative high incidence. This emphasizes the importance of improving the fishing industry particularly fish pond output, and the poultry industry of Luwu. At the same time, incomes must be improved so that the farmers, who comprise the bulk of the population, will be able to consume these products themselves rather than being forced to sell them for cash income.

7.2.3. Incidence of Disease

Tuberculosis and anemia were the most common ailments for which poeple were treated in 1980-1981. A total of 8 percent of the population was treated for these problems. This does not reflect the true incidence of these diseases since many people who have them are not treated.

Seven percent of the population was treated for malaria. That this figure is not coincident with the

[1]All information in this section unless otherwise noted is from Dinas Kesehatan, Kabupaten Luwu.

portion that have the disease is borne out by a study of three villages in the Malili area in 1970. This study found that 19 percent of the population was infected by malaria.[1] In addition, "of the 659 people examined 97 percent were found to be infected with at least one parasite, 80 percent with two or more, and over 60 percent with three or more parasites. Those in whom no parasites were found were, for the most part, infants".[2]

The incidence of malaria may not be as high for all of the Kabupaten. One of the villages was comprised of migrants from Java who had a higher incidence of the disease than native Sulawesians. Based upon data for the other villages, perhaps 10 percent of the population of Luwu had malaria at that time.

The 10 most prevalent problems for which people received treatment in 1980-1981 were:

	Percent of Population
Tuberculosis	8
Anemia	8
Malaria	7
Diarrhea	7
Bronchitis	5
Abscesses	5
Eye Problems	4
Worms	3
Scabies	3
Accidents	2

[1] J. H. Cross, et. al, "Intestinal Parasites and Malaria in Margolembo, Luwu Regency, South Sulawesi, Indonesia", The Southeast Journal of Tropical Medicine and Public Health, Vol. 3, No. 4, (December 1973): p. 590.

[2] Ibid., p. 588.

7.2.4. Health Facilities

Most of the Camats, when queried on the subject of health facilities, indicated they were satisfactory in their areas. Perhaps they were basing this evaluation on conditions of the recent past. In any event, the statistics concerning the facilities available suggest that, according to the standards of the last quarter of the twentieth century, much more needs to be done to adequately provide for the medical needs of a population of one-half million people.

There are two government hospitals in the Kabupaten. Both are located at Palopo. In addition, there is a government leprosarium, a private hospital at the P.T. INCO facility at Soroako and a military hospital in Palopo.

There are 11 doctors and 283 nurses in the Kabupaten. Again, this figure does not include those at P.T. INCO and at the military facility. This represents one doctor for 45,000 population and one nurse for a little less than 2,000 population. The problem of the shortage of nurses is exacerbated because some are reported to be volunteers and cannot be relied upon to adhere to a schedule.

Shown below are the other facilities in the Kabupaten.

	Number
Clinics-cum maternity clinics	10
Clinics	95
Health center-cum maternity clinic	16
Subhealth center-cum maternity clinic	18
Subhealth center	2

In addition there are three clinics-cum maternity clinics and one clinic which is privately operated.

It is quite apparent that health facilities and personnel must be expanded. The main constraint will be the expansion of personnel. This may be a limiting factor in the health development program.

Table 7.11 and 7.12 show facilities and personnel by kecamatan. Also shown are data concerning the number of desas in each. From inspection of this, it is possible to evaluate the magnitudes of the problem of lack of health facilities and personnel in the Kabupaten.

TABLE 7.11

MEDICAL PERSONNEL
BY KECAMATAN
1980-1981

Kecamatan	Desas	Doctors	Nurses	Midwives
Larompong	8	-	15	2
Suli	14	-	8	2
Bajo	14	1	24	4
Bastem	9	-	12	-
Bupon	12	1	29	3
Wara	11	6	33	15
Walenrang	14	-	42	5
Sabbang	8	-	15	3
Limbong	9	-	8	1
Masamba	11	-	21	4
Malangke	6	-	5	1
Bone Bone	18	1	21	4
Wotu	7	-	14	4
Mangkutana	9	-	20	5
Malili	5	1	12	8
Nuha	8	1	14	7
Total	156	11	293	68

SOURCE: Dinas Kesehatan Kabupaten Luwu.

TABLE 7.12

HEALTH FACILITIES
BY KECAMATAN
1980-1981

Kecamatan	No. of Desas[a]	Health Center Maternity	Subhealth Center Maternity	Subhealth Center	Clinical Maternity	Clinic
Larompong	8	1	1	–	–	5
Suli	7	1	–	1	–	5
Bajo	14	1	2	–	–	7
Bastem	9	1	–	–	–	6
Bupon	12	1	2	–	–	8
Wara	11	1	3	–	–	6
Walenrang	14	1	4	–	–	9
Sabbang	8	1	1	1	–	5
Limbong	9	1	–	–	–	2
Masamba	11	1	1	–	–	3
Malangke	6	1	–	–	–	4
Bone Bone	18	1	3	–	–	13
Wotu	7	1	–	–	1	10
Mangkutana	9	1	1	–	3	6
Malili	5	1	–	–	3	3
Nuha	8	1	–	–	3	3
Total	156	16	18	2	10	95

SOURCE: Dinas Kesehatan Kabupaten Luwu.
a October 1982.

7.2.5. Health Budget

The Kabupaten development budget expenditure for health totalled Rp. 493 million in 1981-1982. This was 3 percent of the total development budget for that year. On a per capita basis, this was Rp. 978. This, of course, is the amount expended for facilities and not personnel or supplies. Nonetheless, it seems low when consideration is given to the apparent need mentioned in the preceding paragraphs.

TABLE 7.13

DEVELOPMENT BUDGET EXPENDITURES FOR HEALTH
1981-1982

Kecamatan	Rupiah Per Capita[a]	Index
Larompong	140	31
Suli	63	14
Bajo	113	25
Bastem	560	123
Bupon	84	18
Wara	4,842	1,064
Walenrang	29	6
Sabbang	35	8
Limbong	654	144
Masamba	159	35
Malangke	112	25
Bone Bone	0	0
Wotu	37	8
Mangkutana	84	18
Malili	265	58
Nuha	104	23
Total	671	100
Luwu unsegregated	307	
Grand total	978	

SOURCE: Various budget documents.
a Combined budget data divided by 1980 population.

8. Development Program Budget and Expenditures

8.1. Budget

The budget for Kabupaten Luwu is comprised of two parts which are the routine budget and the development budget. The routine budget covers the recurrent expenses which are for administration and supplies. The development budget is used to undertake the development programs and is comprised of the costs of construction and equipment.

The routine budget amounted to Rp. 3.2 billion in 1981-1982 while the development budget was Rp. 15.1 billion making the total Rp. 18.3 billion for the year.

8.2. Source of Funds

By far the greatest portion of the funds in the development budget is the Project Luwu special budget. This was Rp. 8.6 billion or 57 percent of total. The provincial budget was one percent of total and kabupaten funded budgets were 10 percent. The remainder was from the federal budget. This is shown in table 8.1.

8.3. Expenditures

Expenditures as recorded were slightly different from the summation of the budgets being Rp. 15,091 million compared to Rp. 15,088 million budgeted. The expenditures have been allocated on a project-by-project basis according to function or subsector and kecamatan (see table 8.2).

When considered on a per capita expenditure basis by Kecamatan, the development budget appears to have been allocated on an extremely uneven basis in 1981-1982 when considered on a per capita basis. Without analysis of need during that year in each kecamatan, however, it is impossible to determine whether this was the appropriate action or not.

TABLE 8.1

DEVELOPMENT BUDGET BY SOURCE
1981-1982
(Million Rupiah)

	Rupiah	Percent of Total
Central Government		
Sectoral budget	1,609	11
INPRESS No. 2	189	1
INPRESS No. 3	502	3
INPRESS No. 5	1,436	10
INPRESS No. 6	188	1
INPRESS No. 7	223	1
INPRESS No. 8	400	3
INPRESS No. 9	95	1
Rural development projects	226	1
Project Luwu	8,592	57
Province of South Sulawesi	129	1
Local budget Kabupaten	599	4
Kabupaten development budget	900	6
Total	15,088	100

SOURCE: Kabupaten Daerah Tingkat II Luwu.

As would be expected the subsectors having the greatest expenditures were irrigation and transportation. Irrigation accounted for 38 percent of total while transportation comprised 25 percent. Expenditures for education accounted for 11 percent of total.

This type of priority is typical in the early stages of development of a region. Roads are an obvious need and receive priority. They also usually involve large sums of money. The heavy expenditure for roads can be expected to continue.

TABLE 8.2

DEVELOPMENT BUDGET EXPENDITURES
1981-1982 BY FUNCTION
(Million Rupiah)

	Rupiah	Percent of Total
Agriculture	541	4
Irrigation	5,802	38
Fisheries	13	a
Forestry	232	2
Manpower/transmigration	209	1
Transportation	3,710	25
Electricity	389	2
Education	1,626	11
Health	493	3
Municipal activities	1,059	7
Communications	80	1
Industry	1	a
Other	936	6
Total	15,091	100

SOURCE: Kabupaten Daerah Tingkat II Luwu.
a less than 0.5 percent.

Irrigation projects are also large users of funds. This heavy commitment also is likely to continue.

Communications development which includes telephone, telegraph, radio and television represented only one percent of total in 1981-1982. This is low and will have to be expanded significantly if the development program is not to be impeded by the inability to communicate with the outside world. Expenditures for health also seem low for this stage of development of the area.

Approximately 66 percent of the expenditure is unallocated among the kecamatans (table 8.3). This includes the funds for the irrigation and roads construction among others. This is understandable. It is also conceivable that Kecamatan Wara which is the administrative center should have an expenditure level on a per capita basis which is 278 percent of average for the kecamatans. What is more

TABLE 8.3

DEVELOPMENT BUDGET EXPENDITURES
1981-1982 BY KECAMATAN

	Rupiah		
	Million	Thousand Per Capita	Index Per Capita
Larompong	257	12	115
Suli	288	18	172
Bajo	313	9	86
Bastem	245	20	192
Bupon	314	6	57
Wara	1,771	29	278
Walenrang	243	4	38
Sabbang	281	10	96
Limbong	121	11	105
Masamba	143	6	57
Malangke	110	6	57
Bone Bone	292	6	57
Wotu	136	5	48
Mangkutana	229	6	57
Malili	222	15	144
Nuha	124	4	38
Total Kecamatans	5,089	10	100
Luwu, unsegregated	10,002	20	
Grand total	15,091	30	

SOURCE: Kabupaten Daerah Tingkat II Luwu.

difficult to understand, as examples, is that the Kecamatan Walenrang per capita expenditure should be 38 percent of average and Kecamatan Wotu 48 percent. The overall development expenditures seem quite uneven on a per head basis, insofar as the distribution among the Kecamatans is concerned.

The levels of expenditure, of course, reflect needs of each area as well as the expenditure of the previous years. Therefore, with complete knowledge, the lack of uniformity may be quite understandable.

9. Organizing for Planning

The multisectoral development program during the past in Kabupaten Luwu has been an effort of several government agencies coordinated by a project manager in the Ministry of Manpower and Transmigration. The effort, known as Project Luwu, was confined to North Luwu and to only a few of the many organizations engaged in the development of the Kabupaten.

A planning office for the Kabupaten Luwu, BAPPEDA TK II Luwu, was created in January 1982 to assume future responsibility for planning coordinating the development program. It was formed through joint cooperation of the Kabupaten Luwu Administration and Project Luwu, to ensure that a coordinating office for development planning will be operating in Luwu when the Project Luwu Headquarters completes its operations in December 1983. Operating funds are provided entirely by the local government, with technical assistance, computing equipment, and training funds provided from a USAID Project Luwu grant and loan.

This approach complies with new governmental policy which emphasizes "bottom up" planning instead of traditional methods of planning from the top down. The BAPPEDA is now in the process of developing an organizational structure, trained staff and the mechanisms to formulate a planning process. This is in accordance with national policy as

delineated in the decrees and directives listed and elaborated below.

The policy concerning local government planning is outlined in two documents published in 1980:

Presidental Decree Number 27 of 1980

Decision of the Home Affairs Minister Number 185 of 1980.

These two documents refer to the planning for long-range or 25 years, and intermediate term, or five year, periods. These plans are described in:

Home Affairs Memo Number BANGDA 1-9-26 dated 20 November 1978, and

Home Affairs Memo Number BANGDA 1-4-4 dated 21 April 1979.

Decree 27 authorized the creation of a BAPPEDA TK II at the Kabupaten level, which is implemented through Decision 185. As defined in these two documents, the general duties of BAPPEDA TK II Luwu are to assist the Bupati in the formation and evaluation of development policy. Specific tasks of the BAPPEDA TK II include:

Compilation of a basic development program which consists of a 25 year plan and a 5 year plan.

Compilation of annual programs to implement the plan from local, provincial, and national funds.

Incorporation, with the area secretary of the Kabupaten and the BAPPEDA finance office of the development program within the local budget.

The earlier memos from the Directorate General for Area Development outlined an intermediate term plan document consisting of:

Local development priorities.
Direction and policy for development.
Sectoral targets.
Funding strategy.

Decision Number 185 outlines a general planning process for the BAPPEDA staff which includes:

Coordinating the planning of all government offices.
Coordinating and conducting all research for planning.
Following the process of plan preparation by development agencies.
Monitoring development progress.

These documents charge the staff with the task of coordinating and implementing kabupaten planning activities for the purpose of policy formulation and evaluation. Section II of Decision Number 185 provides that the BAPPEDA will coordinate with the various government offices and the private sector to indentify and formulate projects and programs and to implement plans. The BAPPEDA will continue to conduct planning studies to assist the Bupati and Governor in determining development policy, and the various government offices and the private sector will carry out

this policy through program and project development and implementation. The BAPPEDA office will monitor these development activities to ensure timely program/project completion and as input into future planning.

From the above, it is apparent the legal framework for the formulation of a Kabupaten plan is in place. In order to undertake this, the Luwu Planning office was established as a type "B" BAPPEDA, comprised of four divisions and a secretariat.

BAPPEDA TK II LUWU

1. Chairman

2. Secretariat

3. Division 1 - Data and Reporting
   a. Reporting Section
   b. Analysis Section
   c. Statistics, Documentation, and Input-Output Data Section
   d. Data Gathering Section

4. Division 2 - Economics
   a. Agriculture Section
   b. Industry, Mining, and Energy Section
   c. Trade and Cooperatives Section
   d. Private Sector Development Section

5. Division 3 - Socio-Cultural Affairs
   a. Education Section
   b. Welfare Section
   c. Information Section
   d. Population Section

6. Division 4 - Infrastructure
   a. Irrigation Section
   b. Communication and Tourism
   c. Land Use
   d. Natural Resources and Environment

The BAPPEDA office is responsible directly to the Bupati and acts as his advisor on all planning and development matters.

The function activities listed do not include some which are important to the Luwu economy. Perhaps they are combined in the areas shown. In any event, the areas which are important and should be addressed include, but may not be limited to:

a) manpower
b) health
c) transportation
d) research including macroeconomics
e) forestry
f) fishing
g) municipal services including urban planning, urban water, and eventually, sewage and waste disposal.

Irrigation is misplaced since this is a productive rather than a supporting function.

More important than this, however, is that the BAPPEDA does not appear as yet to have been organized to formulate and budget plans and, more significantly in practice, to ensure that plans formulated are accomplished. This means that two new divisions should be formed or the existing ones given the responsibility for these functions.

The planning and budget functions belong together. It has been observed in other countries that the budget often times has little relationship to the program delineated in the intermediate term plan. This is usually a result of a lack of communication but also stems from political factors. Therefore the budget function must be closely knit to that of planning. Personnel in this group would not only make short-term plans (budgets) in their area of responsibility, but would also coordinate with the Area Secretary of the Kabupaten and finance organizations at other levels to assure conformance with planning objectives and policies and that programs planned are funded to the extent possible to meet objectives.

The plan formulation process would draw from the expertise of the functional organizations as well as their close association with their counterparts in the implementing organizations such as Bina Marga or Irrigasi.

The program control function is as important as the one for planning. Program control consists of monitoring the programs of executing organizations. This is not monitoring in the sense of inspecting the work to determine if it is according to the design. Rather, it is the process of

determining what may be inhibiting the timely completion of work and to eliminate bottlenecks. Other times, these bottlenecks are intersectoral in nature and require the action of the office of someone in authority such as the Bupati.[1] The program control section would have no actual authority itself but would act as a reporting agency to achieve its purpose through the office of the Bupati.

Probably the best location for these activities would be as staff exercising functional authority over the experts in the existing BAPPEDA line organization. The location of these functions in the BAPPEDA, however, can vary considerably.

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[1]An example of the kind of intersectoral problem that can exist is mentioned on page 10.2.6. -f9. This is the type of problem that hopefully would be allowed to develop.

10. The Special Development Program

The Luwu Area Transmigration Development Project was begun in October 1975 following the signing of a Loan Agreement between USAID and the Indonesian Government. The goals of the project were to (1) increase the agricultural production of the Kabupaten; (2) improve the well being of its low income groups; and (3) build an institutional capability to plan, direct, coordinate and evaluate the integrated development of the Kabupaten.

To accomplish these goals the project was divided into six major subprojects with the management staff personnel coordinated by the Project Luwu's Project Manager. The subprojects are:

The Road Subproject is under the Ministry of Public Works, Highways Division. The trunk road is being built from Palopo to Malili by contractors and will facilitate the movement of passengers and freight within the Kabupaten and provide a connection with areas to the South. A priliminary plan for Kabupaten roads has been developed.

Irrigation Subproject under the Ministry of Public Works, Water Resources Management Division. A network of canals for water control are being built and maintained as undeveloped areas are cleared and settled.

The Transmigration Subproject is under the Ministry of Manpower and Transmigration. This subproject provides

overall management of the project and directs the resettlement of families from the overcrowded areas of Java, Bali and other islands.

The Health Subproject is under the Ministry of Health. With the large incoming population into a new area, an extensive health program assists transmigrants with adjustment problems. This program has been discontinued as a special project.

The Farm Cooperative Centers (FCCs) Subproject is under the Ministry of Trade. These centers located near to the RECs aid the farmers in marketing their farm surpluses as well as provide materials and equipment required for improved farm practices.

The Rural Extension Centers (RECs) Subproject is under the Ministry of Agriculture. Most of the areas being settled as well as those already under cultivation require farm extension and agricultural services.

In addition to the subprojects formally considered to be "Project Luwu", there are other areas of foreign aid development which should be noted.

The highway from Palopo south to Kabupaten Wajo is being improved. Other irrigation works are being constructed. These are in the Pompengan Project at Lamasi. A rural electrification project is underway in Kecamatans Bone Bone and Mangkutana. Extensive training activities have been undertaken.

10.1. Roads Subproject

10.1.1 Backbone Road

The scope of the project is the improvement of the road to connect the towns of Larompong and Malili. The road when completed will link with the ones from Kabupaten Wajo to Pare Pare and from Malili to Soroako. It will then provide improved access to Ujung Pandang. The road provides the connection of the towns of the Kabupaten with the secondary and feeder road system.

This project is in two parts. One is financed by contributions from USAID and will connect Palopo and Malili. The other, financed in part by the Government of West Germany, connects Palopo with Kabupaten Wajo.

The project from Palopo to Malili was conceived in 1977 and was engineered and designed at that time. The design proved to be inadequate and the road had to be redesigned. Further delays resulted from a decision of the Government to decrease costs by lowering the design level of this and other roads so that available funds could be used over a wider geographical area. The width of the road was reduced from 5 meters to 4.5 meters and the shoulders from 1.0 meters to 0.75 meters. As a result of the delays due to redesigning as well as problems relating to planning and programming, construction is a year and one-half behind schedule.

The change in design will decrease the safety level of the road. It will also increase the maintenance problems because trucks cannot pass without running onto the shoulder of the roadbed. In addition, some bridges are also being constructed to conform to the narrower roadbed. They, along with the road, will have to be widened when the volume of traffic increases.

The road is divided into two sections for construction purposes. Section I from Mina in Kecamatan Bone Bone to Malili in Kecamatan Nuha comprises 78 kilometers. It contains 5 major bridges and many small culverts. Three bridges and four box culverts remain to be completed. Overall, 72 percent of Section I is completed.

Section II consists of 98.5 kilometers from Palopo to Mina. There are eight concrete structures in place and nine to be rehabilitated. In addition, two bridges outside the overall contract are to be completed. Paving was finished in October 1982. The structures will be completed in June 1983.

The cost of the construction will total Rp. 7.8 billion. It was originally estimated to be Rp. 4.2 billion[1].

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[1]This information was derived through interview with the Chief Engineer, Louis Berger International, Inc., the supervisor of construction.

The rehabilition of the sector of the Larompong-Malili road south from Palopo to the Kabupaten Wajo border is nearly completed. It is scheduled for completion February 1983 but will be finished at mid-year 1983. Construction was begun in February 1980.

The asphalt pavement surface is 4.5 meters in width with the shoulders 1.5 meters wide. Total cost is about Rp 11.5 billion 60 percent of the cost being provided by the West German government. A German firm in conjunction with a local firm prepared designs and supervised construction.

10.1.2. Kabupaten Roads

The road system of Kabupaten Luwu can be characterized as rudimentary. The completion of the road between Kabupaten Wajo to the south and Malili in the northeast in 1983 will provide the backbone of a road system that remains to be undertaken. This road will connect 13 of the 16 Kecamatans in Luwu.

The Kecamatans of Bastem and Limbong will still be accessible only by foot or horsepaths. Kecamatan Malangke will be accessible by boat or by primitive roads[1].

Many of the villages are connected by footpaths. A lack of bridges precludes vehicular access to many villages

[1]All information in this section is from Louis Berger International, Inc., "Luwu Road Program Development Study, Volume I Text", October 1982.

The recent development program has been largely ineffectual because inexpensive methods of construction have been used resulting in a short lifetime for completed works. A roads program has been developed for the Kabupaten which will overcome this problem including upgrading design levels, increasing construction and maintenance standards and other actions to improve construction techniques and maintenance.

Three proposed all-season roads to connect the Kecamatans of Bastem, Limbong and Malangke with the remainder of the Kabupaten have been studied.

10.1.2.1. Present Conditions

Except for the roads from Palopo to Kabupaten Tana Toraja and from Larompong to Malili and Nuha, all existing roads in Kabupaten Luwu can be classified as local roads according to the Bina Marga definition. The roads to Kecamatans Malangke, Limbong and Bastem, when constructed, will be collector roads. They will satisfy the Bina Marga conditions for collector roads in terms of function but not in terms of average speed and side access.

As stated previously the existing network[1] comprises

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[1]Information in this section does not include the existing roads from Larompong to Malili/Nuha and Palopo to Kabupaten Tana Toraja as well as the collector roads to Kecamatans Bastem, Limbong and Malangke which remain to be constructed.

79 roads with a combined length of 562 kilomters. Sealed roads comprise 4 percent of total, gravel roads comprise 53 percent and the remainder or 43 percent are earth surface roads.

The existing condition of the roads is characterized as:

	Kilometers	Percent of Total
Good	16.8	3
Fair	115.5	20
Poor	233.8	42
Bad	172.0	31
Under construction	23.9	4
Total	562.0	100

A reliable road, according to a modified Bina Marga definition used in the study of kabupaten roads, is a road which is ".....an all-weather road not subject to flood which, as far as can be deduced is passable to 4-wheeled vehicles throughout the year". According to this definition, the roads can be characterized as:

	Kilometers	Percent of Total
Reliable	87.0	16
Unreliable	451.1	80
Under construction	23.9	4
Total	562.0	100

During the period 1979-1980 through 1982-1983, funds have been allocated and/or expended for the construction of

23 roads. The precise number of kilometers involved in the program is not known but is about 155 kilometers. Funds allocated and/or expended total Rp. 962 million. Cost per kilometer varies from Rp. 2.9 million for the Suli-Para-Kayu road to Rp. 15.4 million for the Wawondula-Temanpu road.

The foregoing does not include the Lamasi area roads being improved as part of the irrigation project in that area. A total of 33.8 kilometers of asphalted and 8.6 kilometers of gravel roads are being constructed in connection with the irrigation project. Thus, total roads constructed or under construction in the Kabupaten since 1979-1980 amounts to about 198 kilometers.

10.1.2.2. Vehicles in Use

The number of four-wheel vehicles of all types registered in Kabupaten Luwu totalled 1,566[1] in 1981. In addition, 2,018 motorcycles and scooters were registered in that year. These numbers have been increasing rapidly. Four-wheel vehicles have been increasing at an average annual rate of 34 percent per year in recent years while two-wheel vehicles have increased at a rate of 7 percent per year from a much higher base level.

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[1]The total for 1981 in table I.3.8 of the source document by Louis Berger, International, Inc., adds to 1,428 rather than 1,566 as shown. It is assumed the figure shown as total (1,566) is the correct figure.

Traffic volume is low by almost any standard. Excluding motorcycles and scooters, traffic volume was 451 average vehicles per day at Karetan on the Palopo-Malili road in Kecamatan Bone Bone and 187 average vehicles per day at Masamba. These figures, while low, are up very substantially from the results recorded in 1979 and 1980 at the same locations.

Traffic orientation in Kabupaten Luwu is dominated by the city of Palopo. All public vehicles operate with Palopo as one destination.

10.1.2.3. Construction Methods

Construction is carried out by local contractors. Roads are generally constructed of a gravel standard with seven meters of roadbed with four meters of road surface. Road construction practices have serious shortcomings in the case of both design and construction. Problems are:

a) The aggregate used is natural river gravel. The larger cobbles need to be screened. Screening plants should by purchased as part of equipment.

b) Road designs are made without cognizance given to flooding in areas where flooding exists. Hand labor is used and embankment construction is often not undertaken.

c) Shoulders are often poorly designed in that water cannot drain from the pavement, i.e., the road surface has no camber.

d) Supervision of construction is lax and insufficient. Specifications often are not followed. On roads reviewed, pavement gravel laid was not to specifications.

e) The subgrade was found to be neither leveled nor cleared of grass before gravel pavement was laid.

f) The lack of mechanization of construction makes the achivement of a flat road surface difficult.[1]

Pipe culverts are generally not used because of their lack of availability. Instead, timber bridges are used. Often the structure blocks part of the channel causing debris to accumulate and insufficient water channel area. They are, however, cheap, use local materials, and are easy to construct. Two types of bridges are used. These are permanent bridges of masonry and concrete and temporary wooden bridges.

10.1.2.4. Maintenance

At present there is no organized maintenance of roads. New roads deteriorate. When they are sufficiently in bad condition they are rehabilitated. This results in both increased economic cost because traffic must use poor roads and also increased cost for rehabilitation. The main reason for the lack of maintenance is lack of funds, i.e., the difficulty in securing appropriations for maintenance[2].

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[1] Ibid., pp. 49-51.
[2] Ibid., pp. 91-92.

10.1.3. Collector Roads

The Consultants studied the roads connecting Kecamatans Bastem, Limbong and Malangke with the remainder of the Kabupaten. After sensitivity analysis, they found that the internal rates of return would be:

	Worst Case	Best Case
Bastem road	2.9	9.0
Limbong road	7.9	15.0
Malangke road	17.8	27.4

Because of the manner of organization of the report, it is difficult to ascertain which benefits were included in the totals. Apparently no attempt was made to quantify social benefits other than some which were related to education and medical services.

The Consultants concluded that the Limbong and Malangke roads were economically justified. They, therefore, scheduled the construction of these two roads in their five year development program. They suggest that the Bastem road be improved from Rantepao in Kabupaten Tana Toraja to Bokin, a village on a ridge above Bastem on the border of the two Kabupatens. Villagers could then walk to Bokin for access to Rantepao. They suggest further study of this option.[1]

[1]All of this information was taken from Chapter II.1.

The foregoing does not appear to be a reasonable long-term solution to the problem of connecting Kecamatan Bastem to the outside world. Perhaps a better way would be to concede that the road to Luwu is not economically justified and construct it based upon social and political considerations. In any event, this is a decision for Government.

10.1.4. Future Program for Local/Collector Roads

A future road program has been specified. This includes 83 roads. Costs have been estimated for each and benefits evaluated.

From this a five year program has been developed to improve roads of the Kabupaten. This program comprises four parts. These are roads, bridges and drainage, maintenance and an unprogrammed contingency fund. Overall the program amounts to an expenditure of Rp. 12.4 billion in 1984 prices over a five year period. This is summarized in table 10.1.[1]

The schedule of the Consultants will require substantial revision for five year planning. This is in addition to what normally would be expected following a

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[1] Ibid., pp. XI. The table on page XI of the source document contains several arithmetic errors. It has been assumed that summation of the detail is correct and this figure is shown in table 10.1. which follows.

reasonably firm estimate of the financial resources available. Areas of adjustment which are immediately apparent include the following.

1. There is no apparent allocation for incremental recurring or administrative expense in the program.

2. Equipment purchase and establishment of workshop for equipment and laboratory are scheduled for the first year only. Planning, ordering and delivery of foreign equipment and spares will require more time than this.

3. The allocation of 10 percent of equipment cost for spares for the first year and 5 percent thereafter is insufficient.

4. All of the training is scheduled for the first two years.

5. Consultants are provided for only the first two years. This seems inconsistent with the authors' evaluation of existing construction practices and control of them. Further, the consultants proposed a highway engineer for 18 months and a mechanical engineer/equipment specialist for 3 months. Considering the number of consultants required for the Larompong-Malili road, this does not seem adequate.

6. The program proposed shows an expenditure increase from Rp. 603 million in 1982-1983 to Rp. 3.6 billion in 1984-1985. Almost seven-eights of the program is scheduled for the first three years. Half of it is to be done the first two years. This seems unrealistic. The six-fold increase in capital absorption would unbearably tax the resources of the implementing agencies as well as the entire kabupaten.

7. The very important matters of manpower, and institution building are not given attention. Seemingly this would be an ancillary part of a kabupaten road plan.

8. The program does not take into consideration the irrigation service roads which are to be constructed in North Luwu.

The Consultant's report, while having the shortcomings noted above, with extensive revision will provide the basis for a work schedule for roads to be included in the intermediate and long-term programs in the Kabupaten development plan in 1983. Suggested modification are as follows:

1. Extend the program over a longer period, say 8 to 10 years.

2. During the first year, a) prepare designs and contract documents; b) order foreign heavy equipment and spare parts, foreign laboratory and workshop equipment; c) construct shop and make ready for arrival of workshop and laboratory equipment; d) begin training program in first year and continue several years until training is no longer needed (4 years minimum); and e) include on-the-job training using project tools and equipment.

3. Coordinate use of consultants over longer period, at least 4 years; provide the consultants at time of need and give them authority to participate in funding procedures, inspection and approval of work, setting up and operating shop, ordering equipment (heavy, laboratory and workshop), and training procedures.

4. Begin construction the second year with about one-half of schedule shown (not more than 2 billion rupiahs).

5. Spare parts should be about 12-15 percent of first cost for first year and 8-10 percent per year thereafter.

6. In some of the newer areas where transmigrants have been settled, the only means of access is by irrigation canal and tertiary farm roads. It is suggested that some of these existing and future irrigation system roads serve as part of the road network.

TABLE 10.1

TENTATIVE FIVE YEAR ROADS PROGRAM
(Million 1984 Rupiah)

	1984/ 1985	1985/ 1986	1986/ 1987	1987/ 1988	1988/ 1989	Total
Ordinary Programs						
Road improvement	455.4	478.1	471.8	475.9	469.5	2,350.7
Bridge and drainage	26.7	66.5	77.3	73.5	40.3	284.3
Maintenance	26.5	43.5	58.5	91.4	145.3	365.2
Unprogrammed	231.0	190.4	211.8	221.8	252.8	1,107.8
Contingency	55.5	58.4	61.5	64.7	68.1	308.2
Subtotal	795.1	836.9	880.9	927.3	976.0	4,416.2
Special programs					-	
Road work equipment	870.3	-	-	-	-	870.3
Spares	87.0	44.0	44.0	44.0	44.0	263.0
Workshop and Laboratory Building	87.1	-	-	-	-	87.1
Workshop equipment	73.7	-	-	-	-	73.7
Laboratory equipment	44.6	-	-	-	-	44.6
Consultants	150.2	60.2	-	-	-	210.4
Training	16.4	16.4	-	-	-	32.8
Malangke road	1,343.0	895.3	-	-	-	2,238.3
Limbong road		2,404.3	1,603.9	-	-	4,008.2
Subtotal	2,672.3	3,420.2	1,647.9	44.0	44.0	7,928.4
Contingency	132.9	12.0	4.4	4.4	4.4	158.1
Grand total[1]	3,600.3	4,269.1	2,533.2	975.7	1,024.4	12,402.7

SOURCE: Louis Berger International, Inc.

[1]Does not include cost escalation factor.

preparation of the Master Plan for Irrigation which was completed in March 1977. Since preparation of the Master Plan the Dutch Consultants have continued to provide technical assistance to the Luwu Irrigation Project.

In 1973 USAID began to consider the possibility of providing assistance in the Luwu area. As a result a first phase agreement was put into effect which, in addition to other aspects, would provide construction funds and technical assistance to rehabilitate and extend irrigation systems for an area of 10,760 hectares in the Bone Bone and Kalaena areas over a 4-year period. The AID loan agreement was signed October 23, 1975. On May 18, 1982 a Project Implementation Letter was issued by USAID. This reduced the area to be irrigated to 8,480 hectares and extended the completion for construction of Phase I work to July 1983.

10.2.3. Area to be Irrigated

The project area of the North Luwu Plain as covered by the "Master Plan for Irrigation" contains about 135,000 hectares of land which is suitable for irrigation. After subtracting non-commandable lands and areas required for infrastructure, the net irrigated area was determined to be about 100,000 hectares.

Phase I of work, as defined by USAID agreement, is to be completed by July of 1983 and will cover rehabilitation and extension of irrigation systems for 1,758 hectares in

10.2. Irrigation Subproject

10.2.1. Description of Project Area

The project area is located in the North Luwu Plain of Kabupaten Luwu. The plain is bounded on the south by the Bay of Bone, on the north by the mountain range of Central Sulawesi, and extends from the town of Palopo on the west to Malili on the east, a distance by road of about 180 kilometers. The project area covers about 2,250 square kilometers or 9 percent of total Kabupaten Luwu.

10.2.2. History of Irrigation

Until 1930 the North Luwu Plain was sparsely populated. It had a population density of about 20 persons per square kilometer. In the mid-1930's, development was started on the North Luwu Plain and by 1941 a total of about 13,000 hectares was brought under semi-technical and village irrigation. Due to World War II and other factors, no further irrigation development was accomplished until 1969 when rehabilitation and extension of the irrigation systems was again initiated by the Government.

In 1971 the Government requested that the Netherlands Government study the project area by sending a Dutch fact finding team to the Luwu area. In 1975 a team of Dutch Consultants was sent to Ujung Pandang to assist the Provincial Department of Public Works with the irrigation development of the North Luwu Plain area. This included

the Bone Bone area and 6,722 hectares in the Kalaena area or a total of 8,480 hectares. At the present time only about 55 percent of the combined systems has been completed.

In the Lamasi area the Dutch Consultants are currently supervising construction of the Pompengan Irrigation System which will serve an area of 4,472 hectares when completed. Work on this system was started in May 1981 and is scheduled for completion in August 1983.

In addition to above mentioned irrigation systems in the Bone Bone, Kalaena and Lamasi areas, there are numerous village irrigation systems in operation which consist of a simple diversion structure from rivers, creeks, or drains and various lengths of small canals and ditches. These systems serve the most accessible areas and those lands with minor drainage or flooding problems.

As the irrigation development continues most of the village systems will be included in development of the various areas of the project. The village irrigation systems will be rehabilitated as required and coordinated with new technical and semi-technical irrigation projects.

Of the 135,000 hectares of gross irrigated land in the North Luwu Plain, 22.5 percent is cultivated, 18.5 percent is covered with brush, about 21.0 percent is covered with light forest and the remaining 40.0 percent is covered with forest. Some of the forest area or about 10,000 hectares

has been cut and cleared since work started on Phase I.

If the current work is completed by the end of 1983 as planned, there will be over 13,100 hectares of technically irrigated systems in the Lamasi, Bone Bone and Kalaena area. This is 13 percent of the total irrigated land in the North Luwu Plain.

10.2.4. Water Availability

In the formulation of the Master Plan for Irrigation, dependable discharge estimates for Luwu rivers were determined at 80 percent of minimum mean monthly flows which occur one year in 20. It was determined that the major rivers (Kalaena, Baliase, Rongkong and Lamasi) would provide more than enough water for any irrigated land near them. There may be periods of low flow when water from the smaller rivers (Makawa, Tabu, Ampok, Kanjiro, Bone Bone, Kauwo, Senggeni, and Tomoni) will not be adequate to meet the proposed irrigation requirements.

Records of stream flow available in 1977 when the Master Plan was completed were not extensive enough to provide reliable estimates of dependable river discharges. Since work started on Luwu Project a hydrometric network has been installed measuring flows in most major rivers of the Luwu area. A network of meteorology stations has also been installed throughout the Luwu area, providing valuable data on the climate of the North Luwu Plain. Now that more

data are available, further studies are needed to reevaluate the hydrological records.

10.2.5. Construction Activities

In October 1976 the first contract for rehabilitation of the irrigation system in the Kalaena area was awarded. During the period 1976 to 1978, six other contracts were awarded in the Kalaena and Bone Bone areas for rehabilitation and extension of the irrigation systems in those areas. All seven contracts were completed and accepted for reimbursement by AID in May 1981.

During late 1980, 1981 and early 1982, five additional contracts were awarded in the Kalaena and Bone Bone areas for extension of the irrigation systems. These contracts were completed and accepted for reimbursement by AID in June 1982.

On September 26, 1980, USAID issued a Project Implementation Letter which decreased the area to be irrigated under Phase I from 10,760 hectares to 8,655 hectares. This amount has subsequently been reduced to 6,722 hectares in the Kalaena area and 1,758 hectares in the Bone Bone area, or a total of 8,480 hectares.

Three contracts for extension of the irrigation system in the Kalaena area were awarded in late 1981, and the work was about 60 percent completed as of July 31, 1982.

The remaining work under the first phase of the AID loan will be contracted during 1982. This includes one contract in the Kalaena area and one contract in the Bone Bone area. All work is scheduled for completion by July 1983. AID will reimburse the Government of Indonesia for 39 percent of the construction cost of the Phase I work when completed.

In addition to the work financed by the USAID loan agreement, the Dutch Government has financed construction of 4,472 hectares of project area to receive irrigation supply from the Lamasi River. They have completed most of the work at the Lamasi weir and diversion structure for the Pompengan Project (4,472 hectares) on the left bank. The diversion structure for the right bank, which will serve an irrigated area of 5,506 hectares has been completed. Tender documents for the Lamasi area right bank have been prepared and construction is expected to begin soon. This work, however, will not be part of the Dutch Government agreement.

The Government of Indonesia with guidance from the Dutch and USAID has provided manpower, equipment and funds for these projects described above and in addition has proceeded with design and construction of several additional projects. Among these are: (1) construction of temporary weirs on Kanjiro and Kalaena Rivers; (2) construction of the permanent weir on the Kalaena River scheduled for completion in July 1983; and (3) construction of several small desa

systems. The desa systems will ultimately be part of the master plan development. Until then, they will be served by less reliable water supply developed by temporary diversion from nearby streams.

10.2.6. Problems Encountered to Date

(a) Survey - Accuracy of surveys in many areas of the project has been very erratic causing major changes to be required during construction. These changes cause delays in the completion of work and add considerable extra cost for resurvey, redesign and reconstruction.

(b) Design - Many design problems have arisen since work started on the project. Some of these are:

(1) Survey information was not accurate and was not adequately detailed for some areas.

(2) Soils information was not sufficiently extensive.

(3) Information on crest elevations along rivers and high tides elevations of the Bay of Bone were not adequate.

In general, most design problems have been a result of a lack of basic information needed to design properly initially. In both the Bone Bone and Kalaena areas, there are extensive areas where soils are very light (silty sands and sandy silts). These soils when saturated become very unstable and erode very easily when excavated at slopes of more than 2 horizonal to 1 vertical.

Along the Kalaena and Pawesoe Rivers the design elevations used for top of levee and drainage outlet structures are not high enough in some areas. This allows overtopping of the levee at flood crest. At one location along the Kalaena River, the river has meandered and the levee has been eroded away in one section. At another location along the Pawesoe River the levee was overtopped by high water from flood flows in May and June of 1982. This washed the levee over one of the drainage structures and filled the drainage channel with sediment more than one meter deep.

(c) Construction - Some of the major problems related to construction are as follows:

(1) Lack of qualified contractors. Most of the contractors working on Project Luwu have lacked experience, equipment and management to perform well.

(2) Lack of control by Irrigasi inspection. The field staff have not been trained properly and have not enforced work in the field to comply with specifications.

(3) Care of heavy equipment. One of the major problems to date has been the care given to heavy equipment on the project. The Government of Indonesia and USAID, realizing that contractors were not capable of providing heavy equipment for their contract work, decided to provide at least part of the equipment needed on a lease basis. There are presently 87 pieces of heavy equipment owned by

GOI. At the end of August 1982 there were less than 40 pieces in service. Most of these are in bad condition and in need of repair and service. At the present rate of use, service and repair, it is estimated that no more than 8 to 10 pieces of equipment will be serviceable by July 1983 when project work is scheduled for completion. The lack of heavy equipment could delay completion of Phase I work.

Present procedures require that the contractors operate, service and maintain the leased equipment (P.K.K.). This method has not been successful because the contractors have poor shops and limited servicing facilities, lack spare parts, and lack experienced personnel. The lease agreements for equipment prepared by Irrigasi have not adequately controlled use of equipment by the contractors, and have not been properly enforced by Irrigasi officials.

(4) Lack of material testing during construction. Irrigasi to date has not set up a laboratory to perform needed soils and concrete tests on the construction projects. A few soil compaction tests have been made at the request of AID. These tests were very scattered and were not representative. They were taken at the top of embankment, with none taken at lower levels to determine if the entire embankment was compacted in conformance with specifications.

(5) Quality of work is poor. The poor quality of work which is being completed by various contractors is a result of all of the problems listed above. These are: lack of qualified contractors; lack of control by Irrigasi inspection; unavailability of heavy equipment due to improper care in use; and lack of testing during construction.

The temporary Kalaena weir which diverts irrigation water into the system has been washed out and it is now questionable whether or not it can be kept serviceable until the permanent Kaleana weir is completed. The latter is expected to be completed November 1983. This schedule will not be met, however, without major effort by the contractor.

(d) Operation - The major problems in operation of the systems are due to poor quality of work performed on completed sections as well as inadequate training of personnel to operate the systems. Many of the structures are not functioning as designed. An operational plan of cooperation between the Provincial Public Works staff and water users has not been developed and implemented. A workable program between Irrigasi (design and construction) and the Provincial Public Works (operation and maintenance) has yet to be developed and implemented.

(e) Maintenance - The problems related to maintenance are also caused by poor quality work as mentioned above. In

both the Bone Bone and Kalaena areas, extensive sections of canals, tertiaries and quartenaries have been completed by various contractors and accepted by Irrigasi and AID, but are already in need of repair. The major problem areas are improper stripping along earth canals; embankment materials which contain weeds, roots and grass; and compaction which may not have been completed in accordance with the contract specifications.

At the present time Irrigasi has reconstruction contracts under way for rebuilding some canal banks and repairing some of the structure. More reconstruction work is planned during 1983.

Some of the Bone Bone and Kalaena system have now been in service for about three years or 1.5 years since they were accepted by USAID. Despite the length of time since completion, the operation and maintenance program is not working as it must if the systems are to remain in service.

One of the major problems is the lack of recognition by government that heavy equipment is required to maintain systems of this size. Most of the experience with operation and maintenance to date has been connected with small irrigation systems where hand labor has been effective. What must be realized is that maintenance of main and secondary canals of large projects as well as service and farm roads is beyond the capability of hand labor. The need

for a combination of equipment and hand labor must be recognized.

(f) Alignment of responsibilities - Areas of responsibility between Irrigasi and the Provincial Public Works Department must be delineated. The initial organization must be formulated. Equipment, shops, spares and tools must be purchased. Training courses must be formulated and undertaken. Finally, plans and programs for the Provincial Public Works Department to assume full control of the operation and program must be developed. It is also apparent that the funding of the operation and maintenance program must be substantially increased if it is to become a reality.

(g) Coordination - At present time about 3160 hectares of the Kalaena irrigation system under Phase I have been completed. Latest surveys indicate that only about 1360 hectares are being irrigated. There are three main reasons for this:

(1) Clearing of the land was not adequate originally and now the regrowth is restricting access.

(2) Farmers were not available to assume control of the land at time clearing was completed and when water was available. It has been reported that part of this problem may be attributed to large areas of land being controlled by absentee land owners.

(3) There are some problems with design of the system; and as a result it does not function properly.

A study is now underway involving representatives of Project Luwu land clearing function, Irrigasi design

function and local govenment to provide plans to correct the above problem.

10.2.7. Recommendations

(a) Study of Water Resources in Kabupaten Luwu

A general study should be made of available water resources in Kabupaten Luwu to determine their best uses considering the irrigation needs of the North Luwu Plain. The potential for hydroelectric power in Kabupaten Luwu and especially in the rivers of the North Luwu Plain appears to be very attractive. This is especially true if some of the structures could serve multiple uses such as irrigation, hydroelectric power, flood control, fishing, and recreation.

(b) Review of "Master Plan for Irrigation"

A review should be made of the "Master Plan for Irrigation" of the North Luwu Plain with revisions and updating as the needs dictate and expanding it to include South Luwu. Some of the areas where special consideration should be given are: hydrology; cropping patterns; water availability; and priority for future development. Other areas of consideration relating to social criteria, economic criteria and implementation capacity are required for overall project coordination and planning. These must also be given adequate consideration.

Hydrological records and projections as presented in the "Master Plan" are not sufficiently reliable to continue to serve as guidelines without additional information and

supporting data. A study is needed to assess the present status of records and current record keeping procedures and to reevaluate all information available at this time.

A review of cropping patterns is needed to determine if the ones anticipated at time of "Master Plan" development are being followed and if changes and/or modifications are needed.

The Dutch Consultants, in studies made during early 1982 have suggested that some changes may be needed in method of irrigation application from technical to semi-technical. This would affect the application efficiency as proposed in the original "Master Plan". If the application efficiency is lowered, an additional water requirement would result. Even under present "Master Plan" projections there is a period of water shortage during the dry season in many of the smaller rivers. If additional water for irrigation is not available, the only alternative would be to reduce the irrigated areas.

Based upon the review of hydrology and cropping patterns and any changes or modifications from the original "Master Plan", a review must be made of water availability for the future proposed development. Particular emphasis should be placed on adequacy of low flow in smaller rivers during the dry season.

to provide, service, and maintain heavy equipment needed for the work. It has been necessary for Irrigasi to assist the contractors by providing them with equipment on lease. Irrigasi must provide tighter controls on the use, service and repair of heavy equipment in accordance with the lease agreement. Further, it is recommended that changes be made in type of lease agreement for heavy equipment. These changes will be discussed in the following recommendations on management of heavy equipment.

It is recommended that Irrigasi provide better training and support to inspectors and field personnel to help them control inspection work in the field. Inspectors in the field, with support of their field supervisors, should have the authority to require the contractor to perform the work in accordance with plans and specifications. If the inspector determines that work is not being completed in the proper manner, the contractor should be informed that payment will not be made until work is performed properly.

Payment should only be made on those portions of work which are completed in accordance with the plan and specifications.

A materials testing program should be developed and followed for each contract to assist the inspectors determine if contract work is being completed in accordance with the specifications. This would include making soil

compaction tests during construction of embankments. Irrigasi should have their own materials testing laboratory with equipment and personnel capable of performing required tests. The laboratory should be located near the work site.

(e) Develop a Management Plan for Heavy Equipment

It is recommended that the management of heavy equipment on Project Luwu work be converted from P.K.K. (Government owned, contractor operated and contractor maintained) to P.K.P. (Government-owned, contractor operated and Government maintained) and eventually to P.P.P. (Government owned, operated and maintained) for operation and maintenance use of the completed irrigation systems. This method of management of heavy equipment will aid contractors who cannot provide their own equipment during the construction period. It will then provide much needed equipment for the operation and maintenance of the irrigation system when construction is completed. Changing the method of management will require establishment of shops by Irrigasi in the Project area with trained personnel, tools, spare parts and equipment at each location to perform service and repairs, including service trucks for servicing equipment at the site. A minimum of three are now needed at Lamasi, Bone Bone, and Kalaena.

Changing the management procedure for heavy equipment can have far-reaching effects on all aspects of work

performed on the Project. The lack of serviceable equipment is affecting the quality of work on all contracts. The contractors are using hand labor to perform work which should be accomplished with heavy equipment to meet specification requirements. Tremendous amounts of hidden costs are being added to the project costs due to poor management of heavy equipment.

(f) Develop Management Plan with Budget for Operation and Maintenance.

It is recommended that a management program for operation and maintenance of the irrigation systems, including detailed organization and financing, be worked out between Irrigasi and the Department of Public Works of the Province.

The most urgent need is to develop a program which will insure completion of construction in accordance with plans and specifications. Irrigasi at that time should be able turn the completed facility over to the Department of Public Works of the Province. What is needed is cooperation between the organizations to realize that much preparation, organization, funding and action is needed by each during the interim period, and for each organization to assume their responsibilities as agreed to.

Project Luwu will have a construction period of 25 to 40 years. It will thus be necessary that the responsibility

for the irrigation system be turned over to the Department of Public Works of the Province as each section is completed. The most urgent need now is to implement the operation and maintenance program on the portions of the system that have been completed.

It is also necessary to educate the farmers better concerning their responsibilities in accepting irrigation water from the system. They should be trained on methods of water system operation and their responsibilities in maintaining the tertiary and quarternary systems. Water users' associations must be organized and functioning in each area as the portions of the system are completed.

10.2.8. General Comments

Phase I of Project Luwu is scheduled to be completed in 1983. It is important now to review the present status and determine where and what improvements should be made in future phases of the project. Present plans for future work must be modified to reflect better data and the experience with existing systems.

Qualiity of work completed to date is of great concern. Measures must be taken immediately to improve these conditions. The quality of work on the irrigation systems affects all areas of the project, not only presently but also for the life of the project. If work is performed in a manner that does not meet the design specifications,

the completed works are more likely to deteriorate faster. This causes additional operation and maintenance costs, or reconstruction of portions of the system. Availability of usable and dependable heavy equipment, with shops, trained personnel, service and repair equipment and spare parts, will have a tremendously favorable effect upon the quality of work performed.

The combined efforts of Irrigasi and the Provincial Department of Public Works to provide the necessary budget and planning will be necessary to effectively operate and maintain the completed sections of the irrigation system. This aspect of the project to date has been largely neglected and needs to receive immediate attention.

In summary, the work to date on Phase I of the Luwu Project has not progressed as well as had been expected. There are many reasons for this. The important factor at this point is to identify where improvements can be made in future phases of the work. Once identified, these improvements should be incorporated into the planning for future work.

Good communication and cooperation between all of the various Ministries and Directors General and their staffs is most important, with the ultimate goal being a successful Project Luwu.

10.3. Transmigration Subproject

10.3.1. Historic Trends

The low population density of Kabupaten Luwu relative to some other areas of the country has for many years made it a target area for resettlement of people from other provinces. The Dutch colonial government, for example, built several villages for Javanese immigrants in the late 1930's.

The Directorate General of Transmigration recognized the potential for new settlements and began its program of settlement of migrants in the Kabupaten in 1969. Most of the families coming to Luwu are from Java, Bali and the other islands. About 10 percent of the families resettled are from Kabupaten Luwu and are selected by local governmental officials. All receive the same assistance from Government to aid in the relocation process.

In addition to the "official" migrants, there have been settlers from other parts of Sulawesi moving into the area to find opportunity in the undeveloped areas. These spontaneous migrants did not have governmental assistance and have relied upon their own resources to develop their land and provide the requisite farm infrastructure.

10.3.2. Resettlement Policy

Resettlement became a national policy in Instruction Letter No. 7 of 1972 of the Ministry of Home Affairs. The

purpose of the policy as delineated in this document is to relocate persons living in a "pre-village" status to villages where they can be "dynamic and rational". The resettlement villages would be in areas which have a good communications network, are suitable for agriculture, and are influenced by regional and national plans.

The responsibility for implementation of the program lies with local government with planning, coordination and guidance from the Ministry of Home Affairs. Costs of infrastructure and housing would be borne by the central government with other costs being paid by local governments. The National government's portion of the cost in 1979-1980 was Rp. 67 million. Recently, the local government has been interested in developing a program to assist the local people who want to settle in the area. This is commonly termed a "resettlement program".

The Bupati, Kabupaten Luwu, by decree No. 14/II/KDL/1980 established a Resettlement Guidance Committee and Resettlement Implementation Committee and their compositions. These committees include representation from the broad spectrum of organizations involved in guiding and implementing the programs. Guidance and implementation committees have been organized by the Governor at the Provincial level and the Bupati in Kabupaten Luwu.[1]

[1]Much of this information is from Checchi/DMJM, "Resettlement Potential in Kabupaten Luwu, July 1980".

10.3.3. Potential Resettlement Areas

The historic natural geographic population pattern in Kabupaten Luwu has been along the main road which traverses it from the south in Larompong to the northeast at Malili as well as at accessible points along the coast. The settlement of land away from these areas has, in general, been through the colonization activities of the Dutch and the more recent transmigration programs. Areas which remain largely unsettled because of lack of access roads are located in Walenrang, Sabbang, Malangke and to a limited extent in Masamba and Bone Bone. These Kecamatans have extensive areas with fair to good soils which have not been settled. They, therefore, offer the best potential for future transmigration programs.

Criteria have been developed to determine which potential areas are best suited to being settled under the transmigration program. These are:

1. Existing population growth. Resettlement areas should be areas of slow growth so that the in-migrants will not compound an already existing tendency toward overpopulation.

2. Availability of land. A resettlement site must have suitable land in sufficient quantities.

3. Quality of soils. Most of the soils in the North Luwu Plain are suitable being Class II or III.

4. Topography. Land should be level and well-drained.

5. Access. If access roads must be constructed, the cost of the programs are increased. Therefore, it is desirable to develop areas where this infrastructure is available.

6. Presence of other development projects. Areas where there are ongoing projects such as irrigation are best suitable to resettlement.

7. Local interest in resettlement. Since local government will have a big role in determining the success of the resettlement program, a favorable local governmental attitude is desired.

Using the above listed criteria for guidance, approximately 28,500 hectares have been found to be available for future resettlement under the transmigration program. This will accomodate 11,345 families. This information is detailed in table 10.2.

10.3.4. Proposed Resettlement Projects

A number of organizations have proposed resettlement projects in Kabupaten Luwu for various reasons. Among these are the Office of Rural Development, the Social Assistance and the Social Guidance Sections of the Department of Social Welfare, the Directorate General of Forestry, and others. At the time of the analysis in 1980, the families planned for resettlement numbered 5,287.

The number of governmental bodies involved in this activity resulted in an uncoordinated program. In order to overcome this, resettlement guidance and implementation committees have been organized by the Governor at the provincial level and the Bupati in Kabupaten Luwu.

The reasons for the proposed resettlements vary. The Rural Development office program proposed to put landless cultivators who tend to be somewhat nomadic into permanent settlements. The programs of the Department of Social Welfare will resettle victims of natural disasters and settle isolated families into villages close to social services centers. The Directorate General of Forestry program will move families out of protected watersheds.

TABLE 10.2

POTENTIAL RESETTLEMENT AREAS

Site	Hectares	Families
Pontap-Ware	not yet definite	100
Pompengan-Walenrang	2,050	700
Lamasi Kanan-Walenrang	+ 1,090	435
Salulemo-Sabbang	300	150
Sumpirah-Sabbang	1,900	760
Mappadeceng-Masamba	300	100
Masamba-Selatan	4,000	1,600
Malangke	+17,600	7,000
Tamuku I-Bone Bone	250	100
Tamuku II-Bone Bone	300	120
Sumbern byiur-Wotu	200	80
Pawesoi-Wotu	+ 300	100
Angkona (Transmigrasi)-Malili	240	100
Proyek Kelapa Sawit-Nuha	not yet definite	not yet definite
Total	28,530	11,345

SOURCE: Checchi and Company.

In order to assess the reasonableness of these proposals, a study was made in 1980 by a consultant as part of the Project Luwu activity. The areas of possible potential for resettlement were assessed. It was determined

that over 28 thousand hectares were available. This would accommodate 11 thousand families (table 10.2).

10.3.5. Ministry of Transmigration Program

Transmigrants under the program of the Ministry of Manpower and Transmigration have to qualify under one or more of the following criteria:

a) Do not own land or come from an area of poor farmland.

b) Have been affected by some natural disaster.

c) Occupation is that of farm labor.

d) Must have desire to become a farmer.

They must also be of good character.

Prior to the migrants' arrival, the government clears the land they are to settle and constructs the facilities including housing, roads and bridges, schools, mosques, meeting halls, markets and other infrastructure. After arrival, each family, which averages five persons, receives two hectares of land, food for one year distributed 12 times a year, and seeds, fertilizers, pesticides, etc. The cost per family in 1981 was Rp. 2 million. These are direct costs and do not include such overhead items as staff to manage the resettlement area, training, etc.[1]

[1]All information about this program was secured from Kantor Transmigrasi Kabupaten Luwu.

Each migrant receives 0.25 hectares of land as a farmstead and garden, 0.75 hectares of dry land, and one hectare of sawah. At the time the family's participation in the program is terminated, clear ownership title to the land is given.

At the end of five years, an evaluation team determines if the village is ready to be severed from the program and transferred to local government.

There are two types of migrants. These are the ones from the other islands and those from the local population. The latter comprise 10 percent of the total migrants and are selected by the local government. The conditions for both types are the same.

The land in some of the existing settlements is reported to be of poor quality which is one of the major problems of the program. Yield data for 1980 reported for the migrant village tend to confirm this. Yields are in general somewhat lower than for the Kabupaten as a whole and for the Kecamatans in which the villages are located.

Another problem area is land ownership. Others often claim the land where the villages are located. At the time of transfer to the jurisdiction of local government however these problems have been resolved and the transmigrants have a clear title to the land given them.

There are a total of 80 villages that have been established. Eleven are still under the jurisdiction of the Directorate General Transmigrasi, Kabupaten Luwu.

At the end of 1981-1982, hectares allocated to these transmigration villages totalled 10,488 hectares of which 7,582 had been cleared; 5,551 hectares had been developed; and 2,906 hectares remained to be cleared.

At the present time there are no plans for expanding the transmigration program.

10.4. The Farm Cooperative Center Subproject

The objective of the subproject as initially delineated in the capital assistance paper of USAID was to establish four Farm Cooperative Centers (FCC) in the Luwu area to support the local agricultural cooperatives.

Farm Cooperative Centers' role was to assist the local cooperatives supply farmers with necessary agricultural inputs and provide a market for the farmers by purchasing, processing and exporting their surplus outputs. FCCs were thus complimentary to the irrigation and extension subprojects.

Specifically, the Farm Cooperative Centers' functions were to (1) provide special agro-education and agro-business programs for transmigrants and indigenous subsistence farmers; and (2) encourage more rapid use of improved agricultural practices and disease resistant seed

varieties. It was consequently expected that the introduction of these facilities to the project area would substantially increase the benefits to be derived from all components of the Luwu Project.

The FCCs were to be semiautonomous organizations operating as a secondary cooperative organization through the KUDs. The FCC would provide the milling, storage and marketing functions required by the developing Luwu economy. The centers were viewed as innovative for the nation and pilot in nature.

Although initial capital investments to establish the FCCs were to be financed by the government, FCCs were to be businesslike in nature producing sufficient revenue for operational expenses and repayment of capital loan. Under their proposed structure, this was to be accomplished by deriving revenues from seed multiplication, crop marketing and processing, and agricultural input supply operations. The Department of Cooperatives expanded the range of services provided by the FCCs. Besides the activities previously mentioned, it was planned that the FCCs would also:

a. Encourage the production of secondary crops of high income potential by providing the marketing, transport, and processing facilities necessary for their viable production;

b. Provide agricultural credit facilities to farmers through their KUDs;

c. Provide tractor hire services to farmers where seasonal manpower shortages seriously restrict small holder ability to fully develop arable land;

d. Guarantee reasonable prices for livestock through marketing activities;

e. Produce livestock feed to provide additional crops to market and develop a livestock industry to serve the market at the mining complex in Kecamatan Nuha; and

f. Form desa level agricultural cooperatives and through a comprehensive training program upgrade them to a level where they can serve their members more effectively.

After an evaluation of the resulting managerial and financial implementation resources and capabilities, the number of FCCs to be built with assistance from the USAID loan was reduced from four to three. It was also decided that only one FCC should be organized at a time. The fourth FCC is now in process of being built.

At present there are 29 KUDs participating in the FCC program. Five more are scheduled to begin participation in the near future. This is shown in table 10.3.

10.4.1. Construction Program

Most project activities are in the Bone Bone, Kalaena and Walenrang irrigation project areas. Therefore, much of the construction of facilities has been concentrated there. In addition, a headquarters building and other ancillary facilities have been constructed at Palopo (table 10.4).

TABLE 10.3

FARM COOPERATIVES OPERATING
AND SCHEDULED TO OPERATE

	Number
Participating	
Bupon	2
Larompong	1
Bajo	2
Bone Bone	7
Malangke	1
Mangkutana	3
Masamba	2
Nuha	2
Sabbang	1
Walenrang	3
Wara	1
Wotu	2
Wotu/Mangkutana	1
Suli	1
Total	29
Scheduled to Participate	
Bajo	2
Bupon	1
Walenrang	2
Total	5

10.4.2. Crop Marketing and Processing Operations

The FCCs ability to purchase, process, store and externally market large amounts of grain from farmers and KUDs during peak harvest periods is by far the subproject's most important role. Both FCCs Mangkutana and Bone Bone have conducted viable crop marketing operations.

The current role of the FCCs in the crop marketing operation is to assist the KUDs operate efficient crop marketing services through provision of capital assistance, materials, equipment, transport, and sometimes, a market for

TABLE 10.4

INVENTORY AND STATUS OF STRUCTURES

Facilities	FCC	Location Desa/Kacamatan	Area Square Meters	Completion Date
Office	Subproject	Boting/Wara	500	Dec. 1977
Housing	Subproject	Boting/Wara	210	Dec. 1977
Office	Bone Bone	Bone/Bone Bone	250	Aug. 1979
Housing	Bone Bone	Bone/Bone Bone	250	Aug. 1979
Rice mill unit/ godown	Bone Bone	Kaluku/Bone Bone	500	Sept. 1979
Livestock facility	Bone Bone	Salulemo/Bone Bone	50	July 1979
Tractor garage	Bone Bone	Kaluku/Bone Bone	100	Aug. 1979
Solar drying floor/ godown	Bone Bone	Kaluku/Bone Bone	450	Sept. 1979
Seed mult. unit storage	Bone Bone	Tamuku/Bone Bone	100	Sept. 1979
Seed mult. drying surface	Bone Bone	Tamuku/Bone Bone	150	Sept. 1979
Seed mult. tertiary irrigation	Bone Bone	Tamuku/Bone Bone	943	July 1980
Office	Mangkutana	Wonorejo/Mangkutana	250	March 1981
Housing	Mangkutana	Wonorejo/Mangkutana	250	March 1981
Rice mill unit	Mangkutana	Wonorejo/Mangkutana	150	March 1981
Godown	Mangkutana	Wonorejo/Mangkutana	400	March 1981
Drying floor	Mangkutana	Wonorejo/Mangkutana	545	March 1981
Tractor garage	Mangkutana	Wonorejo/Mangkutana	100	March 1981
Seed unit Mangkutana	Mangkutana	Margolimbo/Mangkutana	100	March 1981
Seed unit drying surface	Mangkutana	Margolimbo/Mangkutana	100	March 1981
Marketing center	Mangkutana	Pertoraharjo I/Mangkutana	100	March 1981
Input supply center	Bone Bone	Bone/Bone Bone	120	March 1981

TABLE 10.4 Continued

Facilities	FCC	Location Desa/Kacamatan	Area Square Meters	Completion Date
Office	Walenrang	Tolemo/Walenrang	250	Feb. 1982
Housing	Walenrang	Tolemo/Walenrang	300	Feb. 1982
Rice mill unit	Walenrang	Tolemo/Walenrang	120	Feb. 1982
Godown	Walenrang	Tolemo/Walenrang	500	Feb. 1982
Godown drying floor	Walenrang	Tolemo/Walenrang	1000	Feb. 1982
Input supply godown	Walenrang	Tolemo/Walenrang	100	Feb. 1982
Harbor warehouse	Walenrang	Pontap/Wara	200	Nov. 1981
Marketing center/ drying surface	Walenrang	Cenning/Malangke	200	Under Contract
Transport unit garage/workshop	Walenrang	Pontap/Wara	268	Under Contract
Workshop/storage unit	Bone Bone	Bone/Bone Bone	100	Under Contract
Input supply center	Mangkutana	Wonorejo/Mangkutana	120	Under Contract
Consultant housing Subproject		Boting/Wara	120	Under Contract
Marketing center	Walenrang	Amassangan/Wara	100	Under Contract
Main office	South Luwu	Bajo	100	Funded
Copra mill office	South Luwu	Bajo	50	Funded
Marketing center	Mangkutana	Wawondula/Nuha	100	Funded
Godown	South Luwu	Bajo	500	Awaiting Funding
Tractor garage	South Luwu	Bajo	100	Awaiting Funding
Copra mill	South Luwu	Bajo	350	Funded
Housing	South Luwu	Bajo	270	Funded
Input Supply godown	South Luwu	Bajo	120	Awaiting Funding

their purchases from farmers. In areas where no KUDs exist or where the KUDs are incapable of providing marketing services, the FCC has provided direct crop marketing services to farmers.

This role was not expected and results from the abdication of this responsibility by several KUDs. The latter, because of bureaucratic and logistical problems with DOLOG, permitted private rice millers to act as middlemen between them and the farmers. The KUDs role became that of purchaser of rice from millers for resale to DOLOG. This resulted in a price squeeze exacted by millers on farmers. The FCC entry into this market has reduced the economic power of millers and farmers' prices have firmed.

The results of this effort are evidenced in the volumes of rice purchased by the FCCs. In the first 13 calendar quarters of operations, FCC purchases have grown from Rp. 3 million per quarter to approximately Rp. 250 million in the current quarter.

10.4.3. Agricultural Inputs

The FCC agricultural input supply activity has operated viably, expanded considerably, and provided a much needed service to the farmers of Kabupaten Luwu.

After more than two years of input distribution without official sanction, the FCCs have obtained Kabupaten level supplier status as a branch of the South Sulawesi PUSKUD for

Kecamatans Sabbang, Masamba, Bone Bone, Wotu, and Mangkutana. Through the formalization of this supplier status and the realization of associated benefits in terms of price, credit provision, and transport subsidy, the FCCs have been able to greatly increase input supply volume while establishing nearly one hundred satelite subcooperative supply stations.

As a result of the more efficient and cooperative agricultural input supply network in the five Kecamatans, both loan demand and repayment rates for official government agricultural credit programs have increased substantially.

The subproject is currently attempting to obtain Kabupaten level input supply status over all of Luwu. Monopoly input supply distributorships have already been granted to secondary cooperative organizations in thirteen Kabupatens in South Sulawesi. Although agreed upon in an August meeting in Jakarta at the Directorate General of Cooperatives, an SK enabling the subproject such status has yet to be issued.

10.4.4. Agricultural Credit Activity

Since their inception, FCCs Bone Bone and Mangkutana have offered a variety of credit facilities to farmers through their KUDs. The demand for agricultural production

credit was substantial once irrigation was available. The farmers could not purchase, fertilizers, pesticides and small implements if they were not available to them on a credit basis.

The FCC Bone Bone responded to the initial demand by providing limited credit facilities to farmers already organized into primary cooperatives on an experimental basis. As a result of the high rate of repayment in the first and nearby all subsequent credit programs, the FCC has now expanded its programs to include most of the KUDs within its operational area. During last year's agricultural season FCC Bone Bone extended approximately Rp. 5 million to over 600 cooperative members of 12 KUDs in the Bone Bone area.

The credit program implementation initially placed a considerable burden upon the administrative ability of FCC Bone Bone. The KUDs' lack of both experience and personnel had forced the FCC to assume the entire administrative and logistical burden of the program's implementation. Interest income generated through the credit programs was often insufficient to offset the program's associated administrative costs.

To correct this situation and enable credit program expansion, the FCC experimented with the Kelompok Anggota or

small farmer group credit system. Under this system, loanees were required to be members of a spontaneously formed subcooperative group. All loans granted to members had to be approved and jointly guaranteed by the group. Security was provided by limiting the amount of loan to the equivalent of the group's savings with their KUD.

The group is also responsible for much of the administrative workload previously undertaken by the FCCs. In addition to completing loan applications and agreement forms and distributing funds to the members, the Kelompok Anggota is also responsible for repayment of the loan to the KUD.

Due to the initial success of this approach, all current FCC/KUD credit programs now utilize the Kelompok Anggota credit system. The FCC's cooperative extension unit has devoted a considerable amount of its resources to the formation of Kelompok Anggota in all areas served by cooperatives. Once the Kelompok Anggota is formed, it is the FCC's objective that it will function as a valuable credit tool to promote increased agricultural production.

Since the formalization of FCC Kabupaten level input supplier status and the inception of the Lappo Ase program, the FCCs have placed priority upon enhancing the implementation of official government agricultural credit programs. This has been done by guaranteeing participants a reliable

and timely supply of inputs and a market so that loans can be repaid. Farm land represented by loan volume for the five Kecamatans supplied by the FCCs has increased from its previous high of less than 500 hectares to over 5,200 hectares within two seasons.

10.4.5. Seed Multiplication Unit Operations

Five crops of improved rice seed have been harvested by FCC Bone Bone and three by FCC Mangkutana. Seeds harvested by the two FCCs along with those of FCC Walenrang's joint seed production activity with farmer-members of KUD Lamasi provided a large percentage of the seed input requirement for the Lappo Ase program of North Luwu. The fifteen hectare facilities under FCCs Mangkutana and Bone Bone can produce 100 tons of seed per season while joint farmer-member production programs in Walenrang could potentially produce the remainder of the Kabupaten's seed requirement.

With the recent experience of rapid seed degeneration and substantial disease related crop losses, the FCC's ability to maintain a sufficient stock of new variety seed is essential to Kabupaten Luwu production. In addition, several current orders for seeds from other provinces indicate a demand for the unit's viable operation.

10.4.6. Land Preparation Unit Operations

The limited land preparation activity conducted at FCC Bone Bone has not achieved a viable level of operation.

Until November 1980, the FCC possessed only two mini-tractors. These were utilized mainly for internal seed multiplication unit operations. At that time, five additional tractors were acquired by FCC Bone Bone through a loan from the Department of Finance. These tractors have since been rented to farmers in the Bone Bone area through their KUD.

The following factors have been responsible for continual unprofitable operation of the FCC Bone Bone land preparation unit.

1. There was an insufficient number of tractors to provide the amount of revenue necessary to cover the unit's operational costs.

2. Rental rates per hectare were well below those of both nonmechanized operations and mechanized units operating in other Kabupatens. Potential cultivated hectares were too low to attain operational break-even levels.

3. The units operated almost exclusively within Kecamatan Bone Bone with its corresponding limited land preparation seasons.

4. An inadequate inventory of spares caused extremely high rates of tractor downtime.

During the last land preparation season, it became increasingly obvious that the demand for a mechanized land preparation service in all rice producing areas of Kabupaten Luwu far exceeded available capacity. In the near future, the excess of demand for land preparation services over

available supply should become even greater for the following reasons:

1. The BANPRES program which provided loans to individual farmers for the great majority of mini-tractors recently purchased in Kabupaten Luwu has ceased.

2. The number of draft animals is decreasing in some areas.

3. There has been a steady increase in the amount of land under rice cultivation.

The subprojects recent procurement of ten minitractor units has necessitated the current reorganization of the units providing the service and a change in their operational methodology. The unit will be upgraded to the status of an independent FCC entity operating under the Central Office, Palopo. It will be active in all four FCC regions. Due to the difference of planting seasons in FCC areas, the unit could operate approximately 250 days per year.

It is expected that with (1) the above method of reorganization and operation; and (2) the procurement of an adequate reserve of spares; and (3) an increase in rental rates, the unit will operate viably in the near future.

10.4.7. Problems

Several problems have been encountered by the pilot project FCCs. These can be summarized as follows:

1. There has been difficulty securing credit to fund operations. In June 1980, a loan of Rp. 94.5 million was extended to FCC Bone Bone from the Ministry of Finance's Department of Monetary Affairs. Two-thirds of the loan was used for working capital while the remaining third was spent on construction and equipment procurement. By late 1982, the FCC had repaid a portion of the loan and had further diluted its amount of working capital through division between the three operating FCCs. A Rp. 211 million loan for FCC Mangkutana working capital needs approved in late September 1982 by the Minister of Finance should, however, alleviate the subproject's illiquidity problems.

2. Impressive results have been achieved by the subproject in the supply of agricultural inputs for the five Kecamatans in the areas where the subproject has been granted monopoly distributorship. Continued progress, however, will be impossible to realize without an expansion of the supply area to include the entire Kabupaten.

3. In the FCC crop marketing operation, the lack of definitive DITJENKOP policy on the specific operational relationships between the FCC and the KUDs, DOLOG, and the BRI has created administrative difficulty, operational inefficiency and has been a major cause of the FCCs inability to provide service to areas with less than fully operational KUDs.

4. The future organizational status of the FCCs remains unclear. The Directorate General of Cooperatives has decided upon two alternative future structures for the currently operating FCCs. The first, and potentially much more attractive, is to create an autonomous PUSKUD in Luwu with operational branches in Kecamatans Bone Bone, Mangkutana, Walenrang, and Palopo. The second is to have the Palopo organization continue as a branch of the South Sulawesi PUSKUD with subbranches in the current FCC locations. With a little over one year of project implementation time remaining, a timely resolution to the status issue will be essential to the project's ability to leave a viably operating post Project Luwu entity.

10.5. Rural Extension Center Subproject

The USAID Capital Assistance Paper of 1975 proposed the establishment and operation of the Rural Extension Centers (REC). Under the original concept four Farm Service Centers were proposed with each consisting of a Rural Extension Center and a Farmers' Association Complex. Their purpose was to fulfill the educational needs of the migrant and local subsistance farmers concerning improved practices and to provide agricultural inputs. These functions have been bifurcated and now the farm supply function is a responsibility of the Farmers' Cooperative Centers.

10.5.1. Organizational Arrangement

The RECs are operated by the Agricultural Agency for Education, Training and Extersion within the Ministry of Agriculture. In addition the Directorate of Animal Husbandry, Fisheries, Forestry and Estate Crops which are also within the Ministry of Agriculture have their own extension service staffs.

There is an organizational forum for the coordination of agriculture extension. This has proven in practice to be relatively ineffectual. One of the more important functions of the REC Subproject has been to encourage better efforts toward coordination at the Kabupaten level.

While there has been a move at the national level to train field extension service workers to work in all fields,

workers in practice tend to specialize. In order to overcome this, the RECs' in-service training sessions cover several subject areas. This training is reinforced by including food crop extension service workers and their immediate superiors in the actual work of REC demonstrations conducted in other subject areas such as livestock, poultry, fisheries, cloves and coffee.

10.5.2. Construction

Four Rural Extension Centers have been constructed as well as a headquarters building in Palopo. The REC centers are located in Kecamatans Bupon, Walenrang, Bone Bone and Mangkutana. Each has a designated area of activity such as estate crops, livestock, etc., and their work covers all of these Kecamatans except inaccessible mountainous areas.

The REC consists of an office, classroom, staff housing and land for demonstration varying in size from two to ten hectares. Ancillary buildings and equipment are also available.

10.5.3. Crop Activities

10.5.3.1. Modified National Extension System

The extension system being employed throughout most of the nation is a type of "training and visit" system which is being encouraged by the World Bank. The system is based on regular visits by a field extension worker to a number of

"contact" farmers who, in theory, transmit the knowledge to other farmers.

Under the RECs, this system has been modified somewhat. In addition to the training and visit system, a number of field training sessions are held at each demonstration site for the contact farmers and others. The extension worker explains and gives a practical demonstration of the important activities which should occur before his next scheduled training day at the demonstration site. The farmers are encouraged to execute as many of these activities as possible.

During the entire program, the training activities are reviewed by the field extension worker; the crop is harvested; the results are compared with those of nearby farmers; and the advantages of the recommended practices are analyzed for the farmers.

10.5.3.2. In-Service Training

Training of REC and Kecamatan staff is receiving emphasis. The training and visit system is reinforced by biweekly training sessions for extension workers at each of the four RECs. When possible, the in-service training is scheduled to coincide with activities being conducted at the demonstrations sites and in the farmers' fields. Practical training is emphasized and some role playing is employed. Past and scheduled attendance of REC staff and kecamatan

agricultural staff from 1980-1981 to the end of 1982-1983 will total 3,500.

10.5.3.3. Farmers Training

The recent trend has been to narrow the number of courses taught to farmers to one or two subjects, (e.g., rice production, improved post-harvest practices for rice, soybean production). Practical training is emphasized and a training plot is usually established so that training can continue after course completion. Courses are usually limited to a maximum of three days. Past and scheduled attendance of farmers from 1980-1981 to the end of 1982-1983 will total 2,000.

10.5.3.4. Rice Crop Training

Rice has been given strong emphasis in the REC. Most of the demonstrations have been on small (0.1 hectare) plots. All inputs in recommended dosages are supplied to the farmer conducting the demonstration. The field extension workers visit the plots frequently to offer advice and conduct the training.

More involved demonstrations are conducted on several farms with farmers working in small groups. The demonstration area is larger (30 to 50 hectares) with emphasis on group management. Usually farmers are participants in programs through which credit and/or some inputs are secured. The REC supplies the improved seed and the additional pesticides which are often needed.

Training is conducted at the RECs and at villages of farmers. While practical aspects of the courses have been very well organized, improvements can be made in the area of visual aids.

Farmers' rice production training courses have been very successful. There has been a steady improvement in the quality of these courses. Informal contacts with the farmers who were trained reveal that farmers retained a major part of the subject matter and use it in their farming activities.

Training for farmers concerning post-harvest activities, e.g., harvesting, threshing and drying techniques, will be undertaken when funds requested in the 1982-1983 REC Supplement DIP are provided.

Two types of specialized rice demonstrations have been conducted. These demonstrations were planned to supply extension information concerning the specific problems of (1) introducing herbicides; and (2) rat control.

The herbicide demonstrations have been very popular with the farmers. An increase in herbicide sales has taken place in areas where demonstrations have been given.

Farmers believe destruction of crops by rats to be their most serious pest problem. Some of the demonstrations in the area of rat control conducted on a small scale were not successful. Therefore, a decision was made to request

funding for a much larger rat control program. This will involve farmers controlling 25 hectares. This should improve rat control in the area because of the increased time the program will cover. Several control methods will be included in the expanded program.

10.5.3.5. Other Food Crops Training

Other food crop demonstration and training efforts have been largely confined to soybeans, maize and crop rotation activities.

One soybean production training course for farmers participating in a credit program from the FCC subproject has been implemented. The training course was well conducted, but its effectiveness was diminished for several reasons: 1) training plots were subsequently damaged by heavy rainfall; 2) lack of good quality seeds; and 3) a lack of research information upon which to base recommendations. Yields were as a consequence low. These problems were exacerbated by low soybean prices. Maize demonstrations have been similarly affected.

While the average yield of dried, shelled maize of 1.94 tons per hectare on REC conducted demonstrations were 98 percent more than the farmers' average yields, yields from the Maros Research Institute for Food Crops, were much greater varying from an average of 4.9 tons per hectare to a high of 5.6 tons.

Fertilizer dosages of nitrogen used in the REC maize demonstrations fell within the recommended amount but the phosphorus dosage used was substantially lower than those used on the research plots. The REC subproject and the Office of Food Crops, Luwu, should now conduct trials with input dosages based on the research findings.

10.5.3.6. Nutrition Training

Several demonstrations were developed to improve the nutritional level of farm families. Under the program to upgrade local chickens, farmers were provided with an improved variety of rooster. The resulting hybrid had the hardiness of local chickens; achieved a 50 percent increase in weight; and produced more eggs. The chicken improvement program is very popular with farmers. The home garden demonstrations provide a means to make more varieties of vegetable seeds available in rural areas. The program is also very popular. Some farmers are now growing vegetable seeds to sell to others.

Two other types of demonstrations are designed to help increase the health and nutritional knowledge of farmers. These are family welfare and food preparation/nutrition demonstrations. It was intended that each be used as a trial and that the number of demonstrations would be expanded in subsequent budgets. None of these subsequent demonstrations have been implemented. While the proposals

have been approved by USAID, plans for their implementation have not been finalized. It is anticipated that the REC staff will finalize plans and implement these demonstrations in the very near future.

The food preparation/nutrition demonstration will be a one day training session to teach farmers' wives how to prepare and preserve food in a manner to retain the nutritional content. The family welfare demonstrations will also be one day workshops covering midwife services, child care, health and sanitation in the home. Both will be conducted by health officials, women's groups, family planning officials and other instructors who can be recruited.

10.5.4. Animal Husbandry Activities

Animal husbandry activities being conducted by the REC have the primary goals of (1) reducing the high mortality rate of livestock; (2) increasing livestock production through improved feeds; and (3) in some cases, the introduction of new varieties of livestock.

The main emphasis is on the vaccination programs which, to a limited extent, were being conducted by the Office of Animal Husbandry. The latter had been inhibited by a lack of manpower and in some cases a lack of supplies. (The Office of Animal Husbandry has only seven staff members to

administer inoculations to the cattle, buffalo, goats, pigs and chickens in the Kabupaten.)

Cattle, buffalo, and in some cases, pigs, are vaccinated against haemorrhagic septicaemia (commonly called stockyard disease) and anthrax. An estimated 5-10 percent of the cattle and buffalo die each year from stockyard disease.[1] The Luwu Office of Animal Husbandry receives enough vaccine to inoculate about 30 percent of the cattle and buffalo. Not all of this is used due to a lack of manpower and operational funds.

In order to alleviate the shortage of manpower for livestock inoculations as well as to further the policy of training generalist field extension workers, the field extension workers from the Office of Food Crops will be trained to administer inoculations to all types of livestock. An agreement has already been reached whereby the Director, Office of Food Crops, will allow field extension workers to inoculate livestock as part of normal duties. The Office of Animal Husbandry will supply training and vaccines. The REC Subproject will assist with the training and include the field extension workers in their livestock inoculation program. Some food crops field

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[1]Aftosis and brucellosis are not livestock problems in Luwu.

extension workers have already been trained and have participated in the REC poultry/livestock inoculation program.

In order to alleviate the shortage of supplies, the REC Subproject has requested USAID to permit some of the REC loan funds to be used to purchase syringes and needles to be used by the field extension workers. An increased allotment of vaccine has been requested from the Provincial Office of Animal Husbandry but as yet a reply has not been received.

An estimated 50 percent of the chickens die from New Castle Disease each year. Mortality in affected flocks varies from 80 to 100 percent. Only about 160,000 doses of vaccine are allocated each year from the Provincial Office of Animal Husbandry. That represents enough vaccine for about 50,000 chickens or less than ten percent of the total population.

The REC Subproject has scheduled 30 units of poultry/livestock inoculation,[1] and funded construction of 5 permanent inoculation pens for large animals. Fifteen of the inoculation units have been implemented to date.

Two chicken vaccination programs are currently being conducted in villages where farmers have been reluctant to have their chickens vaccinated. After the demonstrations

[1] A unit is one session where inoculations are given.

have been in progress for one year, mortality rates among chickens that have been vaccinated will be compared with those that have not been vaccinated. The results will be made the subject of a radio program which will be broadcast from Palopo.

Livestock nutrition activities conducted by the REC Subproject are of several types. Small grass fodder plots have been planted in several locations throughout the Kabupaten. These 0.1 hectare plots serve as sources of improved plantings and as demonstration plots for farmers. Several recommended types of fodder grasses will be visible to farmers.

Another program to improve livestock production though improved nutrition is the grasses preservation demonstration. Small amounts of hay and silage are being produced at several demonstration sites where livestock population is relatively concentrated. While farmers have shown an interest, it is too soon to determine the impact on farmers' practices.

The advantages of having feed stored for times of feed scarcity in the dry season are obvious to farmers. Not so obvious are the benefits to be derived from improved feed quality. An absence of local data to illustrate the advantages of improved feed quality has been a handicap. Attempts to collect such data from obvious sources such as

the REC's own livestock operations however, have met with little success to date.

There is a problem in Kecamatan Bone Bone of cattle not being secured. Fodder is in short supply. Livestock often wander into and damage neighboring farmers' fields.[1] A plot of one hectare will be established to provide a source of plantings of fodder. Farmers will be encouraged to plant fodder grasses which can be cut for cattle feed. While this will not immediately supplant grazing, it should help to reduce the magnitude of crop destruction and provide a visible means of a possible alternative to unattended grazing of cattle.

Farmers will also be encouraged by the REC staff, Office of Animal Husbandry staff and local governmental officials to secure their cattle.

The introduction of improved breeds of livestock has been advanced through several different programs. Improved varieties of chickens are being raised for egg production at three RECs. Operations have been greatly improved during the last two years. Chickens receive better care and records concerning egg production and feed consumption are being kept. Bottlenecks in the feed supply have been identified and measures to overcome them have been taken.

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[1]See section 5.4.12. Concerning damage to field crops.

The Kaki Kambell variety of duck was originally imported from Thailand to this area. These ducks have proven to be very well-suited to conditions in the Kabupaten. The REC Subproject has aided in the introduction of these ducks by demonstrating how to increase the number of eggs hatched. This should develop into a duckling supply activity at the local level. In some areas the RECs will engage in hatching Kaki Kambell ducks for distribution to local farms.

Efforts to introduce a more effective use of animal by-products are centered in the compost production demonstrations.

10.5.5. Estate Crops

The REC is concentrating its effort on the crops of coffee and clove. REC activities relating to coffee growing have been concentrated in Kecamatan Sabbang. It is proposed to bring selected farmers from Kecamatan Limbong to these training programs and demonstrations.

It has been estimated by the Office of Estate Crops that the average coffee yield per hectare could be more than doubled with proper cultivation and management. Growers now, for example, tend to harvest all of the beans at one time. This reduces the quality of the product. REC activities in this crop area are somewhat subdued because of a paucity funds as well as diminished growers' interest due to a decline in coffee price.

The price of clove at present is quite high and growing clove is becoming increasingly popular. Investment in a clove garden is considered a good retirement income producer for farmers and non-farm workers.

Extension work with clove farmers will concentrate on demonstrations of planting techniques, application of fertilizer, and pest control. The Office of Estate Crops will conduct these sessions over a three day period. The REC will also conduct three training sessions in the near future.

10.5.6. Fish Farming

Ten units of REC fisheries demonstrations are proposed. Fish farmers have (1) difficulty obtaining healthy fry, (2) low production, (3) problems constructing ponds, and (4) difficulty obtaining pellitized fish food. Farmers will be encouraged to grow the more profitable shrimp in brackish water rather than milk fish. The current problem of losses of up to 80 percent of fry during transport is being alleviated by introduction of local hatcheries by the Office of Fisheries and education by the REC in the catching and transport of fry. The REC will also conduct demonstrations concerning control of pests in fish ponds.

Many of the REC programs have been somewhat experimental in nature. Follow-up demonstrations have not been planned largely due to a financial constraint.

10.5.7. Educational Materials

The REC has cooperated with the Agricultural Information Service mobile film unit and two trips have been made to Luwu by the unit. Over 11,000 people viewed these films.

Pamphlets and brochures concerning agricultural practices are jointly proposed by the REC and Ministry of Agriculture, Luwu, and the Agricultural Information Office.

A radio broadcasting workshop is proposed for December 1982. Slide/cassette modules are being used in the subject of rat control. Posters are used in conjunction with the livestock/poultry inoculation program. Films, books, magazines, etc., have been purchased for the REC field extension workers.

10.5.8. Equipment

Various types of tools and equipment have been purchased.

10.5.9. Problem Areas

a) Coordination of the many extension services and training organizations and activities is the most significant problem. A possible solution is to establish an agricultural office of planning and coordination outside of the existing Kabupaten level Ministry of Agriculture. The director would report directly to the Provincial Agricultural Office. It would serve as an advisory agency and would cooperate in data collection and planning.

b) An evaluation should be made of the REC programs to determine which should be continued and discontinued. A method of funding the continuing activities should be found.

c) The agricultural research program is scheduled to be completed June 1983. The applicability of the research results should be tested in various areas of the Kabupaten.

d) Several organizations are conducting research in the Kabupaten. There is a need to coordinate these activities.

e) More market information should be made available to growers.

f) Field crop seed production needs to be undertaken to ensure farmers have suitable seeds to plant.

g) Methods must be found to encourage farmers to grow more of the field crops such as maize, soybeans, cassava, etc.

h) Closer supervision of REC field staff by management is needed.

i) The REC at Mangkutana needs to have a water supply if it is to operate effectively.

10.6. BAPPEDA Subproject

The BAPPEDA TK II Luwu office, which was formed in January 1982 as an additional activity under Project Luwu, has undertaken a program to establish a process for integrated kabupaten planning and budgeting for medium term

and annual cycles. This is in collaboration with responsible local and provincial governmental officials and is consistent with governmental administrative and budgetary practices. The planning process will produce an intermediate range development plan.

Planners will be trained to carry on after the end of technical services. Three specific outputs are proposed to be accomplished.

1. Formulation of a planning process
2. Intermediate term plan
3. Training of personnel

The first output is to assist in the future development of a planning and budgetary process for preparing medium term plans and annual programs.

The second is a medium term plan and annual implementation plan and program for the period beginning in 1984-1985. This will be prepared in collaboration with provincial and local governmental authorities.

The third output is a mix of on-the-job training and special courses for professional staff.

To implement this program, a highly qualified staff has been recruited. Training of staff members has begun, and procurement of office equipment and training equipment has been initiated.

The BAPPEDA office is in the process of gathering data in order to create an input-output model of Kabupaten Luwu which will serve as a tool to be used in development planning in Luwu.

The input-output technique was chosen because of its flexibility and because of the discipline inherent in the model during the data collection process. This requires the double checking of all data as both an output of a production process and as an input to another production process or to final demand. The model has several uses.

1) It can be used to identify opportunities for new projects and investments as well as to analyze project proposals relative to their impact on the economy.

2) Several different proposals can be applied to the model as a package to analyze the best mix of project activities, and various projects can be compared to establish development priorities when allocating budget funds.

3) Linkages between individual or groups or projects can be determined using the model. This will enable planners to better predict strains on the economy resulting from the implementation of projects.

4) The model will assist in determining whether the absorptive capacity of the economy will be exceeded by implementing proposed programs. This will be of invaluable assistance in avoiding possible shortages and inflationary pressures.

Since January, staff seminars have been held twice each week to teach the input-output theory and to discuss proper data collection and analysis procedures. These seminars are planned to continue through the end of 1983. At the end of June, 32 staff seminars had been held at the BAPPEDA office.

A training manual for the process of input-output analysis at the kabupaten level is under production as staff seminars and data collection and analysis proceed.

While training in input-output analysis is ongoing, data on basic infrastructure is also being collected for a series of base maps for the Kabupaten. So far a new general map showing kecamatan and desa boundaries, roads, rivers, and lakes has been completed to be used as the base map for all other mapping in the Kabupaten. Land use potential has also been mapped showing available land with economic potential in the Kabupaten.

While the BAPPEDA office continues its planning effort, it is also working with the Project Luwu staff to gather additional economic, marketing, labor force, and other similar types of data to be used to identify future development projects for Luwu Phase II and the Kabupaten five year

development plan. This work is complimentary to other BAPPEDA efforts and will form the data base for planning in Luwu.

10.7. Rural Electrification Subproject

USAID sponsored feasibility studies of four areas nationwide including the Bone Bone/Mangkutana area to determine the desirability of establishing experimental rural electrification project in each. The study was undertaken by the National Rural Electrification Association of the USA. The program developed was modelled after successful projects executed in India and other countries.

One of the first activities following the study was the training of personnel in utility operations. A total of 501 personnel completed 52 courses of study.

The project was undertaken and energized in August 1981 with power provided by four 100 KVA generators which were a gift from USAID. All of the distribution lines are at present temporary. Permanent ones will be constructed starting in March 1983.

Primary circuits are 20KV and service is provided at 220 volts and 50 cycles. This is in conformance with the other systems in the country.

House wiring requires an investment of Rp. 12,000 for materials and labor. The electric cooperative pays the labor cost and makes a profit of Rp. 1,600 per house wired.

Consumers may purchase materials from the cooperative on credit.

At present there are 487 consumers in the Bone Bone area and 243 in Mangkutana. The scope of the system is being expanded and it is expected that by early 1983 there will be 2,100 consumers in Kecamatan Bone Bone and 443 in Kecamatan Mangkutana.

Rates are based upon a minimum charge plus metered usage. The minimum is Rp. 1,100 per month and the charge per KWH is Rp. 45. Average bills are Rp. 2,000 per month representing 20 KWH consumption. Payroll amounts to Rp. 800,000 per month for 67 employees.

Revenues do not cover operating and maintenance costs at present. The Government of Indonesia allocates money for fuel. The Board of the Cooperative doesn't want to purchase additional fuel from revenues to operate during the daytime. Therefore, hours of service are only from 6:00 P.M. to 6:00 A.M.

It is proposed that the Government of Indonesia will provide two 500 KVA generators. These have not yet been ordered and generation capacity will be inadequate if the order is not booked soon.

In the longer term, it is proposed that the Canadian Government will erect an 8 MW generator at the site near Bone Bone. This also has not been ordered and the future of this proposal is uncertain.

Consumers are reported to be eager to accept electric power. Light from electricity is less expensive than from other sources of energy. It is believed that in the long term the electric cooperative could be a financially viable operation. It will be necessary, however, to have service for more than the evening hours before consumers will invest in utility load such as refrigerators which will make the cooperative financially viable.

10.8. Training Subproject

There was an initial awareness there would be numerous problems in Project Luwu due to the complexity of the management staffing and the settling of families. It was recognized the involvement of five different ministries working together in a remote area would require an extensive cooperative effort and intensive training activites to coordinate project personnel. Funds were made available to provide training to assist in the adjustments required for success of the program. The training funds initially amounted to US $122,000. The Project Capital Assistance paper placed stress on the importance of providing management training for coordinated projects.

10.8.1. Early Programs 1976-1979

10.8.1.1. Headquarters Management Staff Training

Luwu Project Headquarters Staff Training funds were initially used primarily to train project staff and other

management personnel. The concept of training in-country and abroad was considered vital to the success of the project because of the involvement of several ministries which had a history of independent operating procedures and functioning. It was assumed the use of across-the-board training for Project Luwu personnel would diminish their traditional independence and a dedicated Project Luwu staff would emerge.

The training activities were begun in August 1976 and staff training was later carried out in Jakarta and at the Project Luwu Headquarters in Palopo to orient and familiarize the new staff with the goals and procedures needed to achieve the project's objectives. In 1977 and 1979 several subproject staff managers were sent to Malaysia, South Korea and Philippines to participate in short training courses on land resettlement. Since then there have been only a few training proposals and programs written for the future training of management personnel.

In 1981, in response to a Government-wide effort to improve development planning, funds were made available for the training of the staff of the BAPPEDA in regional planning. An organized program of five courses was developed within the Project.

10.8.1.2 Agriculture Training

In addition to training management personnel, funds were allocated for training personnel connected to the Rural

Extension Centers and Farmer Cooperative Centers to be located in four critical development areas of the Kabupaten (Padang Sappa, Batusitanduk, Bone Bone, and Mangkutana). These funds were to be used for training in the areas of cooperative marketing procedures, agricultural practices improvement and other related subprojects. Several training sessions were held in the various Rural Extension Centers and Farm Cooperative Centers for field staff of these organizations as well as for local farmers and governmental personnel. During the years since these programs were begun, rather comprehensive proposals have been produced by the staff of both subprojects. Since approvals by USAID were delayed, some slippage has occured in implementing the programs.

10.8.1.3. Other Training Activities

At the beginning of the project, training funds were not allocated for staff development of the other subprojects of roads, irrigation, transmigration, and health since internal training programs already existed within the Ministries of these subprojects. Subproject management staff assigned to the project were included in the overall management staff training but only as their functions related to the project as a whole.

Another reason for light coverage in Project Luwu training for the roads, and irrigation subprojects was that

contractors were used to complete the construction required under the USAID Fixed Amount Reimbursement procedures. Once the work was done the ongoing operations and maintenance functions would then shift to the Ministries involved. Project Luwu responsibility for them would cease.

It became apparent, however, that the ongoing operation and maintenance of the project as a whole would be much more effective if training activities were carried out for the personnel of all the subprojects. Without properly trained people to carry on the project once the contractor left, the project's future would be questionable. The Irrigation Subproject conducted operation and maintenance training for farmers in 1980 and 1981. In 1982 an expanded training course was proposed and conducted to train farmers and local government personnel in irrigation operation and maintenance.

10.8.1.4. The DIP Supplement Procedures

The DIP Supplement procedure resulted in a partial solution to the absence of training funds available to the subprojects. The DIP Supplement procedures are the means by which in all or part of the training activity costs of a subproject are reimbursed by USAID loan funds into a main Government of Indonesia account used to finance the total project.

In order to receive the DIP Supplement funds, subproject managers submitted training proposals to their respective Ministries and to the Project Manager who then processed them for approval or disapproval. If approved, the training was carried out and reports covering the completed training activities were then submitted for reimbursement.

Thus a system was set up to allow all subprojects to have access to additional training funds to be used for Project Luwu management staff training as well as governmental technical personnel who would soon assume the responsibility for many of the project's functions. Some subproject managers were better able to program the use of training funds than others. The amount of funds utilized under the program is shown in table 10.5.

A Training Consultant developed a Project Luwu Training Study which summarized training from 1976 to 1979 and project training requirements through 1982. This study identified unmet needs, established priorities, detailed course curricula, and laid out schedules for a much expanded training program. The cost of the 1980-82 program was estimated to be nearly $2 million in 1979 prices. The funds made available from USAID for training throughout the total period of the project have amounted to only a fifth of that amount or $387,500.

The training study recommended that more training funds be spent all project areas. As a consequence some expansion of training was made into fields such as operation and maintenance of irrigation systems, the development of an economic planning unit for the Luwu area, and the improvement of health services. Notably, the problem of training for road maintenance remains unaddressed.

In 1982 the Training Consultant (1) identified the need and established the priority for the ten courses to be funded from the Headquarters DIPs Budget, (2) presented these and the 1982-83 DIPs programs to USAID, and (3) helped develop analytical studies on the effects of training on Project Luwu. Table 10.6 indicates that as of December 1982 training programmed for over 17,000 people had reached over 10,000 trainees. This leaves a target of over 7,000 trainees to be reached in the final year of the project.

10.8.1.5. Evaluation of Training Activities 1976-1979

In order to effectively evaluate training activities since they began six years ago, it is necessary to examine various subprojects in detail as they have functioned separately and/or jointly to train project personnel.

TABLE 10.5

TRAINING FUNDS, EXPENDITURE BY FUNCTION 1977 TO DATE[a]

	Million Rupiah
Headquarters	
Headquarters training	44.6
FCC	53.6
REC	25.6
Irrigation	11.9
Roads	-
Health	1.6
BAPPEDA	17.5
Total headquarters	154.8
FCC field	88.3
REC field	141.0
Irrigation field	3.8
Roads field	-
Total field	233.1
Total	387.9

[a]Some funds budgeted in 1982 may be expended in 1983.

It has been difficult in most cases to accurately measure the effectiveness of the training sessions since evaluations usually were not made after completion of training. Interviews with Project Luwu's headquarters management staff, field staff and field personnel in 1979 revealed that the majority of the training activities were very well received. This was despite the lack of an overall plan or qualified staff to plan and direct a comprehensive training program. Subsequent to the development of a

TABLE 10.6

PROJECT LUWU TRAINING TARGETS AND COMPLETIONS BY SUBPROJECT AND FUNDING SOURCE AS OF DECEMBER 31, 1982

Headquarters funded

Target							
Courses	8	5	5	2	5	2	27
People	208	570	919	251	97	66	2,111
Completion							
Courses	7	5	3	1	2	1	19
People	207	570	607	1	59	30	1,474

Subproject funded				
Target				
Courses	523	251	7	781
People	9,749	5,250	74	15,073
Completed				
Courses	302	11	7	320
People	8,092	450	74	8,616

Grand total:	Target		
		Courses	808
		People	17,184
	Completions		
		Courses	339
		People	10,090

training study in 1979 and the employment of a Training Officer, some improvement in the organization of training has occurred.

General comments on the effectiveness of the training programs are included in section 10.8.2. which follows.

10.8.2. Evaluation and Current Activities

The following examination of current activities reveals that most of the subprojects held planned training sessions which were reasonably effective.

10.8.2.1. Headquarters Training Subproject

The limited training activities of Project Luwu Headquarters staff personnel were useful in that they oriented subproject managers and key governmental personnel to the overall purpose and goals of the project. Longer and more intensive training of the managers would have better prepared them for project implementation. An absence of a training director in the early years to organize the activities prevented this and managers were forced to direct their respective subprojects without in-depth training. In most cases they trained themselves on-the-job through the trial and error method.

This initial series of Project Luwu orientation courses was very valuable in establishing the basis and framework of the project and can be considered worthwhile. On the other hand, the training travel tours were felt to have questionable value since they were very expensive and served only to give the participants a somewhat broader view of large scale development similar to that planned by Project Luwu. The earlier tours were tourist-type and areas were visited briefly. A longer and more intensive study of particular areas and their key development problems would have made the exercise more useful and worth the high costs involved.

The training activities scheduled for this subproject in the training guide encouraged an approach which tended to make the tours more meaningful. Two project officers have also completed three month courses in the U.S.A.

10.8.2.2. Rural Extension Centers Subproject

Of the six Project Luwu subprojects the most extensive training activities have been carried out by the Rural Extension Centers.

The primary trainers have been local agricultural extension officers (PPL) and area extension officers (PPM) who are stationed throughout the Kabupaten. A number of PPL who are female have become active in the rural extension effort and more are being encouraged to become staff members due to their effectiveness with the local population.

The activities which were carried out over the past five years were well planned and executed in most areas. Trainees interviewed following the courses described the training sessions as "useful" and "well done" and were anxious to have more classes conducted in subjects not yet covered in detail such as rice transplanting, general farming practices, machinery care, etc.

In 1982 an intensified program for rice production occupied a great portion of the available training time for both the agriculture and the FCC subprojects.

Of critical importance to this subproject has been the presence of three Agricultural Extension Advisors whose direct involvement assisted the staff to determine their training needs and formulate the wide range of training activities required by the large farming population which makes up the majority of the transmigrant population. This long-term presence on the subproject has been vital to the ongoing success and future improvement of all training activities.

10.8.2.3. Farm Cooperative Centers Subproject

The Farm Cooperative Centers Subproject has also carried out a number of successful training activities on crop marketing, bookkeeping, financial management and other topics vital to establishing an efficient farm cooperative operation. The field offices in Bone Bone, Mangkutana and Walenrang have been utilized for the practical, on-the-job and in-service training conducted primarily by the FCC Advisor. Three courses are planned for the next year and will be presented at the last of the four Farm Cooperative Centers to be built in the southern part of the Kabupaten. A new course for training personnel in extension of KUDs has been proposed.

In order to maintain the ongoing progress of the centers, continual training is needed for the present and incoming field staff which have to be fully trained in the involved methods and procedures required to operate an FCC.

There has been a high rate of personnel turnover in the past which also needs to be stabilized before the training being presented will be permanent. Since the FCC Advisor is the primary instructor of the training courses and there is a shortage of in-country FCC trainers, retaining this position for another year is critical to the effectiveness of the training program activities.

10.8.2.4. Irrigation Subproject

There were four on-site training courses held in the past five years within the Irrigation Subproject for the field construction section personnel. The primary reason for the relative absence of training activities in this sector has been that contractors who use their own personnel have been used to complete most of the construction projects.

Project personnel such as surveyors and inspectors belonging to the Irrigation Subproject require further training since they will assume a number of new responsibilities as the project expands. With the presence of a Senior Irrigation Engineer Consultant, and a Heavy Equipment and Shop Consultant, considerable in-service training of an incidental nature will occur. While the Training Study outlined a formal program for training personnel, little has been done to implement it.

The operation and maintenance section of the Irrigation Subproject has completed three training activities since the project began. These, in cooperation with the Development of Local Government, have trained 54 farmers in Bone Bone and Kalaena in the responsibilities of membership in water users' associations. These are, however, only a few of the several hundred qualified operation and maintenance personnel needed to carry out the critical support operations vital to the Irrigation Subproject's continuation.

Necessary training activities have been proposed for these personnel and will begin immediately upon approval by USAID.

10.8.2.5. Transmigration Subproject

While some ad hoc on-site training activities have occurred during the resettlement of transmigrants, very few planned training activities have been carried out in the past five years by the Transmigration subproject staff. The primary function of this subproject has been to assist transmigrants to resettle in the new areas and extensive training sessions have not been required.

While few courses have been planned exclusively for the transmigrant group, they have constituted as much as 30 percent of the farmer groups receiving training through the other subprojects. In cases where farming practices were involved the Rural Extension Centers staff and the FCC staff

have conducted the required training to help the transmigrants adjust, till the unfamiliar land, and utilize the new Farmers' Cooperative Centers.

The transmigrants will be targetted as a group in the 1982 health improvement project, which is centered at the Wotu Health Clinic in Kabupaten Luwu.

10.8.2.6. Road Subproject

The training activities of the Roads Subproject have been limited to on-the-job training by contractors and consultants. Although there is a great need for more experienced road inspectors, support personnel for the surveyors and mechanical equipment personnel, the short construction schedule and long working hours are not conducive to additional training activities. A road maintenance training program would be very helpful to the members of local government, as they assume responsibility for certain aspects of maintenance upon the completion of the project.

Some training sessions for the personnel of Bina Marga who will assume the responsibility for maintenance of the road have been carried out by Bina Marga training officers on a routine basis. The officials feel assistance is not needed to train their personnel except for the provision of road equipment by the contractors to help train their heavy equipment operators and mechanics. This would supplement

the slide and tape shows available at the Bina Marga training office in Ujung Pandang and make the training sessions more meaningful to the participants. Several training courses were identified in the 1979 training study and should be considered. The development agency has not expressed interest in these courses to date.

DEFINITIONS OF TERMS

Aneka Tambang P.T.	Mining company owned by the Indonesian government
BANGDES	Rural development, budgetary program
BANPRES	Bantuan Presiden, program which provides loans to individual farmers
BAPPEDA TINGKAT II	Kabupaten Planning Office
Baronang	Marine fish
BIMAS	BIMBINGAN MASSAL, the National Agricultural Credit and Input Intensification Program
Bina Marga	Division of Highways, under the Ministry of Public Works
B.R.I.	Bank Rakyat Indonesia, the national rural banking and credit institution responsible for the provision of funding for BIMAS credit programs and cooperatives, marketing, and capital investment activities
B.T.N.	Bank Tabungan Negara National savings bank
Bupati	Regent or chief executive of a Kabupaten (district)
Camat	Head of government for Kecamatan (subdistrict)
Departemen Pekerjaan Umun	Department of Public Works
Departemen Pendidikan Dan Kebudayaan	Department of Culture and Education

Departemen Perhubungan Dirjen Perhubungan Laut Kanwill VI Kesyahbandaran Palopo	Departemen of Communications, Directorate General of Marine Communications, The VI Area Office of Harbour Master, Palopo
Desa	Village or collection of villages, the political sub-division of a Kecamatan
Dinas Pertanian	Agriculture Service Office
Dinas Kehutanan	Forestry Service Office
Dinas Perikanan	Fisheries Service Office
Dinas Kesehatan	Health Service Office
DIP MURNI	Government of Indonesia Budget disbursements to the sub-projects as the GOI share of local rupiah project costs
DIP Supplement	Local rupiah cost budgets prefinanced by the government which are reimbursable by USAID under the loan agreement
DITJENKOP	The Directorate General of Cooperatives
DOLOG	Depot Logistik, the government's rice purchasing and distributing agency
FCC	Farm Cooperative Center
Gabah	Threshed unmilled rice
Gadu	Paddy grown during the dry season
GOI	Government of Indonesia
INMAS	Intensifikasi Massal, the government program for the distribution and eventual cash sale of subsidized agricultural inputs mainly through KUDs

INPRESS	Presidential Instruction budget
Kabupaten	A regency, the political sub-division of an Indonesian province
Kantor Departemen Perindustrian	Industrial Office
Kantor Statistik	Statistics Office
Kantor Wilayah Departemen Pertambangan Dan Energi Propinsi Sulawesi Selatan	South Sulawesi Area Office of Mining and Energy
Kecamatan	The political sub-division of a Kabupaten
Kelompok Anggota	The small cooperative membership subgroup of a KUD
KUD	Koperasi Unit Desa, the village level cooperative unit of Indonesia
Lappo Ase	A program in South Sulawesi Province to increase rice production
Menteri Muda Urusan Perumahan	Junior Minister of Housing
Paddy Ladang	Upland paddy
Paddy	Threshed, unmilled rice, the equivalant of the Indonesian term "gabah"
Penduduk	Resident, people
Pekerjaan Umum Seksi Pengairan	Public Works, Water Resources Section

PERUMNAS	An agency under the Junior Minister of Housing to construct housing units for sale to individuals
P.K.K.	Heavy equipment management, government owned, contractor operated and maintained
P.K.P.	Government owned, contractor operated, and government maintained
P.P.P.	Government owned, operated, and maintained
Potensi Desa	Village potential
PLN	National Electric Company
PPL	Local agricultural extension worker
PPM	Agricultural extension agent
PPH	Agricultural extension agent, insect infestation/damage monitor
PUSKUD	Pusat KUD, cooperatives center at provincial level
REC	Rural Extension Center
Rendengan	Lowland paddy grown during the rainy season
Repelita	Five year development plan
Sawah	Low lying land, used mostly to grow paddy
SK	Letter of Decree
USAID	United States Agency for International Development