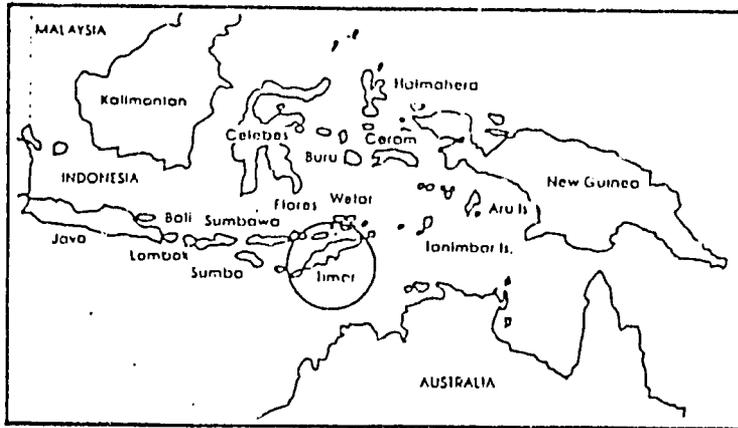


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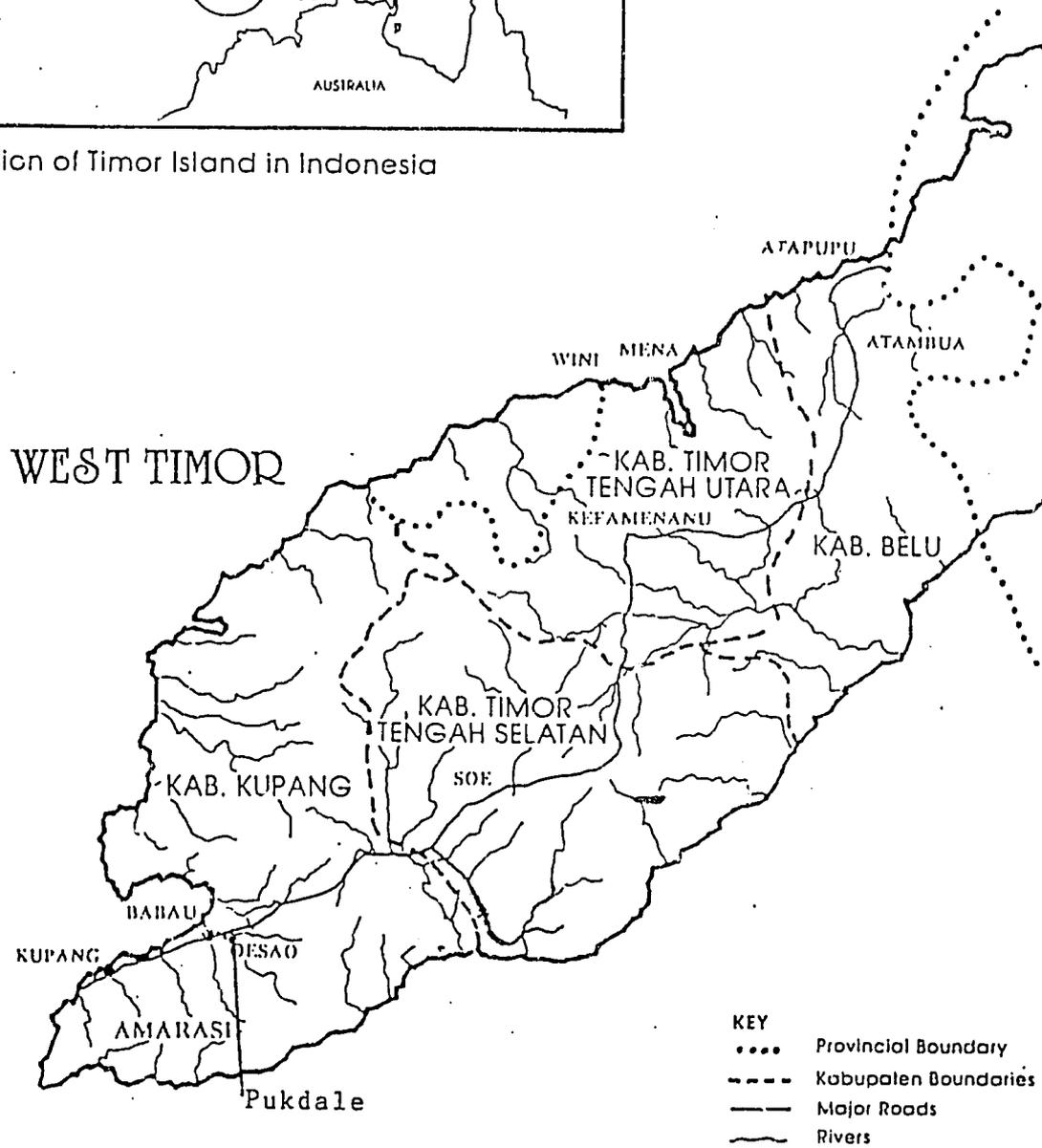
Groundwater Demonstration Plot
Pukdale, Kabupaten Kupang, Timor
Nusa Tenggara Timur

Monitoring Report No. 2
Results of the Baseline Socio-Economic Survey
of Demonstration Plot Households

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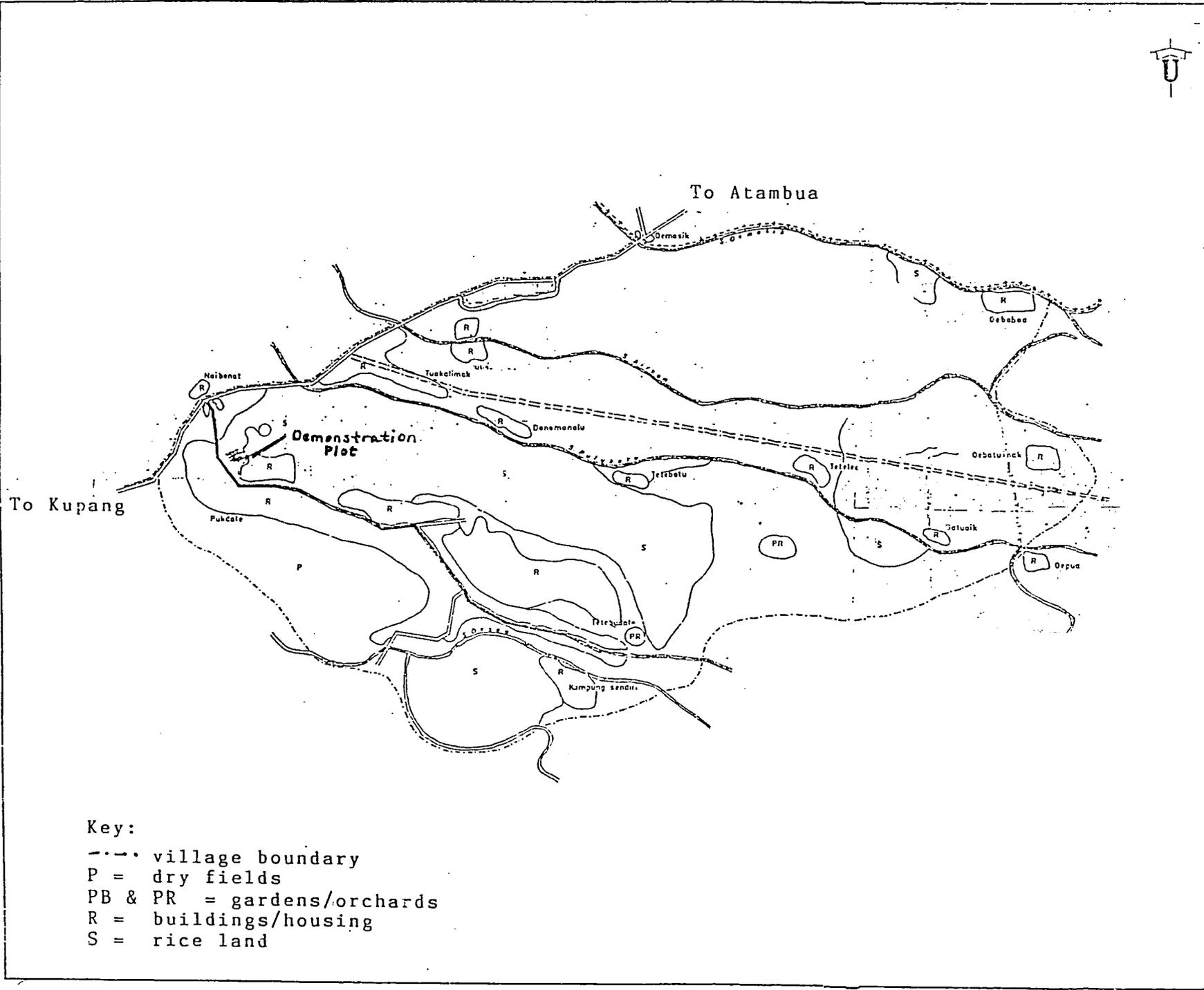


Location of Timor Island in Indonesia





Map of Pukdale Village- 1980
PETA DESA SENSUS PENDUDUK 1980



<p>PETA DESA (BATAS DESA TAHUN 1978)</p> <p>DESA : PUKDALE</p> <p>PULAU : TIMOR</p> <p>KECAMATAN : KUPANG TIMUR</p> <p>DAERAH T.K.I. : KUPANG</p> <p>DAERAH T.K.I. : MUSA TENGGARA TIMUR</p>	
<p>SKALA 1 : 5.000</p>	
<p>LEGENDA</p> <p>Batas Kabupaten/Kacamatan : - - - - -</p> <p>Batas Kecamatan : - - - - -</p> <p>Batas Desa (**): - - - - -</p> <p>Batas Wilayah Penaceahan : - - - - -</p> <p>Batas Blok Sensus : - - - - -</p> <p>Batas Perairan : - - - - -</p> <p>Jalan Raya/Beas : - - - - -</p> <p>Jalan Desa yang diparkes : - - - - -</p> <p>Jalan Desa yang belum diparkes : - - - - -</p> <p>Jalan Setapak : - - - - -</p> <p>Jalan Kereta Api : - - - - -</p> <p>Sungai : - - - - -</p> <p>Jembatan : - - - - -</p> <p>Rawa : - - - - -</p> <p>Pantai Laut/Danau : - - - - -</p> <p>Tanah Sawah : S</p> <p>Tanah Kering untuk Pertanian : P</p> <p>Kelompok Bangunan : R</p> <p>Pertanian Esser : PB</p> <p>Pertanian Rasyak : PR</p> <p>Kuburan : K</p> <p>Wilayah Penaceahan : W</p> <p>Blok Sensus : B</p> <p>Blok Sensus Khusus : EK</p>	
<p>KETERANGAN DESA</p> <p>Jumlah Bangunan : 15 buah</p> <p>Jumlah Rumah Tenan : 295 buah</p> <p>Jumlah Penduduk : 1402 orang</p> <p>Luas Tanah Sawah (Ha) : 1150 Ha</p> <p>Luas Tanah Kering Pertanian (Ha) : 700 Ha</p> <p>Luas Tanah Pertanian Kaya (Ha) : 310 Ha</p> <p>Luas Tanah Lain-lain (Ha) : 1200 Ha</p> <p>Luas Desa (Ha) : 16.000 Ha</p> <p>Peta Asli : Peta Kabupaten/Peta Lainnya</p> <p>**Jarak salah satu</p>	
<p>Tanggal Pembuatan Peta :</p> <p>Dibuat oleh : Sekretaris Desa</p> <p>Tanda tangan : (M. F. B. B. C. E. L.)</p>	
<p>Mengarahi B. menyatakan bahwa PETA DESA ini dibuat sesuai dengan keadaan yang ada</p> <p>Tgl. : 1978</p> <p>Kepala Desa, Pukdale</p> <p>(Z. N. H. S. H. A. U.)</p>	

Key:

- - - - - village boundary

P = dry fields

PB & PR = gardens/orchards

R = buildings/housing

S = rice land

** Berilah warna merah untuk batas Desa berdasarkan tahun 1978.

Executive Summary

This is the second report based on monitoring activities at the groundwater demonstration plot in Pukdale, Oesao, Kabupaten Kupang, Timor, which was established by P2AT (groundwater development division of the Department of Public Works). The report serves two purposes.

1) It provides background information on socio-economic features, agriculture, demographic characteristics, ecological features, and climate for the Oesao plain as a whole, which is the area designated by P2AT and USAID for groundwater development under the Small-Scale Irrigation Management Project.

2) It presents the findings of a socio-economic baseline survey administered to the 23 households that own land within the 7 hectare demplot area. It establishes levels of income and expenditure; land, livestock, and other property holdings; and agricultural productivity for each of the demplot households prior to their deriving benefit from the new demplot irrigation system. The results of this survey will be compared with those of a re-survey conducted at the end of the third demplot planting season (roughly one year after the irrigation system began operating). Data from the initial and follow-up surveys will be used to determine the impact of the irrigation system particularly with regard to changes in cropping patterns, intensity and productivity and to changes in sources and levels of income.

In addition, demographic information and data regarding land and livestock holdings from existing village census records are cited. These data are presented for two reasons.

1) By juxtaposing the consultant's survey data and comparable information from village, kecamatan, and kabupaten records, it was possible to assess the accuracy of existing demographic and property information. This makes it possible to estimate the extent to which such information can be used in the future to develop profiles of potential project sites under SSIMP. The consultant's research revealed that data from village census records were more comprehensive than information available from higher level government offices. Village records were not entirely reliable, however, since households under-report their property holdings (particularly cattle) and since land owned outside of the village does not enter the census either in the village of the owner's residence or in the village in which the land is located.

2) By comparing existing information about the demplot households and other households in Pukdale, it was possible to establish the socio-economic status of project beneficiaries vis-a-vis non-beneficiaries in the village. On the average, project beneficiaries own more productive property (agricultural land, livestock, and tractors) than their fellow villagers. In

addition, the majority of demplot households are members of two of the most prominent and affluent extended families (those of the current and former village heads).

The instrument used for this baseline survey is a comprehensive interview guide. It enabled the consultant to pursue key issues from a variety of perspectives. This strategy was crucial to the collection of complete information on complex issues such as household income and expenditures and the variety of labor and sharecropping arrangements associated with rice production, which are not calculated by the villagers in straightforward monetary terms. For example, villagers generally do not know the exact costs of household consumption, since most of their purchases and exchanges in the market are directly related to the amount of produce they bring in to sell. The amount and variety of their market transactions and the amount of agricultural produce that serves as market currency are conditioned by both the perceived amount of goods needed and the availability of marketable agricultural produce. Similarly, farmers often do not know the amount of their gross rice production. Rather, they measure their yield after harvest shares have been paid to sharecroppers, harvesters, and other laborers.

Throughout Oesao, the primary sources of subsistence and income are rice and corn farming during the rainy season and animal husbandry (mainly pigs and cattle). Households also produce vegetables, chilis, coconuts, and bananas for consumption and to supplement their income from sales of rice and livestock.

The survey of demplot farmers revealed that their per capita incomes and levels of land, livestock, and other property ownership are above average for Pukdale village and the Oesao region as a whole. Average and mean per capita income in 1984-5 were about US\$175 and US\$105 respectively among demplot beneficiaries, compared to an estimated average of US\$132 for Oesao. Average and mean expenditures in 1984-5 among demplot households were about US\$160 and US\$129 respectively. There is no comparable information available for the village or region as a whole.

Demplot households own an average of 4.08 hectares of non-contiguous sawah land within and outside of the village of Pukdale. Like sawah through the Oesao region, the land included in the 7 hectare demplot is used to produce one rain-fed rice crop per year. It lies fallow and is used for livestock grazing during the dry months. For the majority of demplot farmers (61%) their demplot parcels constitute under 10% of their total land holdings. The average sawah holdings for all households in Pukdale as listed in the village census are 1.4 hectares. Total ownership of (non-contiguous) plots of garden and orchard land among demplot beneficiaries and Pukdale residents as a whole averages about 1 hectare.

Livestock ownership is an important feature of the culture and economy of the Oesao region. Cattle and buffalo are used to trample the soil in the preparation of land for rice cultivation. In addition, they play an important role in ritual events and are

regarded as long-term investments. Smaller livestock such as chickens, pigs, and goats are kept as a source of funds to meet regular household expenses. 72% of the households in Pukdale as a whole and all demplot households own one or more kinds of livestock. 43% of the village households are cattle owners with an average herd size of 12. Among demplot farmers, 87% own cattle. Average and mean herd sizes are 59 and 10 respectively. Owners of the three largest herds in the village (100-450 head) are demplot beneficiaries.

The 22,600 hectare Oesao region is one of a number of alluvial plains on Timor. Agricultural production is possible despite such limitations as uncertain rainfall (averaging about 1400 mm. per year over 75 days), long periods of drought, low sophistication of agricultural techniques, and poor soil quality (calcareous with a high clay content making it very hard when dry and sticky when wet).

Farmers throughout Oesao traditionally plant paddy rice between the months of December and February after the arrival of the west monsoon. Yields range between 1 and 4 tons of paddy rice per season, depending upon rainfall, availability of labor to weed and harvest, and losses due to infestation. The costs of rice production range between about US\$180 to \$635 per hectare depending upon the method of land preparation (cattle trampling or tractor); source of labor (household, sharecropper, or hired wage laborers from Kupang); and use of fertilizer and pesticides. The average market value of gross yields varies from US\$186 to \$745.

As a group, the demplot households do not constitute a representative sample of the regional population. They are, on the average, more affluent, slightly larger, and comprised of older members than households in the village at large. Furthermore, there is a concentration of prominent village residents there. The demplot is located in one of the oldest and most densely settled parts of Pukdale and is bisected by the main village road that leads directly to the Kupang-Atambua (trans-island) road.

On the other hand, the explanations of the role of livestock in villagers' lives, organization of agricultural production, division of labor, attitudes about money and other resources, and other issues discussed in this report are directly applicable to a wider population. All of the farmers in the area designated for inclusion in SSIMP groundwater activities are Rotinese like the demplot beneficiaries, and they have the same basic socio-cultural background. Although there are numerous intra-regional variables that may affect project planning and future success (such as ecological conditions, access to roads and markets, villagers' previous exposure and access to rural development programs and so on), these factors must be considered in the context of the basic social, economic, and cultural practices and attitudes that shape the lives and activities of the population of the project area.

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1. Introduction

This is the second of four reports based on monitoring activities at the groundwater demonstration plot in Pukdale, Kabupaten Kupang, Timor. The results of this monitoring are intended to assist USAID and the Government of Indonesia in planning and developing the groundwater irrigation component of their jointly-established Small-Scale Irrigation Management Project (SSIMP). The demplot in Pukdale was established by P2AT (groundwater development division of the Department of Public Works) in Nusa Tenggara Timur (NTT) province in early 1985 prior to the signing of loan and grant agreements for SSIMP. Pumped water for secondary crop (palawija) irrigation became available to the demplot farmers in May of that year. (See consultant's first report, Groundwater Demonstration Plot, Pukdale, Kabupaten Kupang, Timor, Nusa Tenggara Timur: Monitoring Report No. 1- Definition of Methodology, December, 1985 for a full description of the project.)

This second report presents the findings of a socio-economic survey administered by the consultant during the first quarter of demplot operation. The sample of 23 households represents all landowners within the 7 hectare demplot area.

This report also contains background information gained from interviews with village and district (kecamatan) officials, informal village leaders and other non-demplot villagers; from official village and district census reports; from other sectoral government agencies; and from regular participant-observation in demplot and village activities. A detailed description of the methodology employed as well as a copy of the survey instrument are included in the consultant's first report.

The objective of the data collection in Pukdale is three-fold:

1. Elicit baseline information

The survey was intended to determine the socio-economic situation at the demplot before the landowners derived any benefit from their new irrigation system. The results of this survey will be compared with those of a re-survey conducted at the end of the third demplot planting season (roughly a year after the irrigation system began operating). Data from the initial and follow-up surveys will be used to determine the impact of the irrigation system particularly with regard to changes in cropping patterns, intensity and productivity and to changes in sources and levels of income.

2. Address policy issues

A major concern of SSIMP is assuring equity and social soundness of site selection. Since the Pukdale demplot was established by P2AT - NTT prior to initiation of SSIMP, this concern was not addressed specifically in the selection of Pukdale as a project site. The results of the consultant's surveys and other monitoring activities, however, can be used as a comparative basis from which to evaluate potential future project sites and may identify certain specific criteria that should be included in site profiles.

The present report based on the initial demplot survey identifies the project beneficiaries and establishes levels of income and expenditure, property holdings, and so on for each of the demplot households. In addition, demographic information and data regarding land and livestock holdings from existing village census records are cited to establish the relative socio-economic status of demplot beneficiaries vis-a-vis the other households in the village. In the future, this information also may be compared to data on potential project beneficiaries elsewhere.

Policy issues regarding farmer participation in demplot activities will be addressed specifically in the consultant's final report. Comparing data from the initial and follow-up farmer surveys, the report will discuss farmers' time allocation considerations, opportunity costs of demplot participation, and an evaluation of farmers' willingness and capacity to risk expenditures of time and resources in order to utilize a new irrigation system. The results of this analysis are intended to assist USAID and the GOI in evaluating the replicability of the Pukdale demplot and the feasibility of demplot expansion.

3. Address methodological issues

The intensive monitoring activities in Pukdale are not intended to be duplicated elsewhere at SSIMP sites. Rather, one of the consultant's primary objectives is to assist USAID and the GOI in developing efficient and effective monitoring strategies for other groundwater sites that will be developed under SSIMP. In part, this involves determining a) ways in which village- and household-level data can be collected relatively quickly and inexpensively; b) the detail and depth of information required; and c) the level of sophistication required of data collectors.

The initial survey instrument was comprehensive in scope and detail for two reasons. First, very little specific agricultural and socio-economic information was available about people in the project area, so it would not have been possible to assess the impact of the demplot effectively. Thus, the survey was intended to elicit as much data as possible regarding agricultural practices, household budgets, sources of income and types and levels of expenditures for each demplot household prior to their

deriving any benefit from the demplot. Many aspects of the survey purposely were redundant. Questions were intended to pursue the same issues from a variety of perspectives, particularly with respect to potentially sensitive economic questions and information that respondents might consider too insignificant or obvious to mention.

Based on the findings and on the experience of administering the first survey, it is possible to identify key questions that should be included in subsequent surveys of farmers' socioeconomic status and agricultural practices. The consultant's final report will discuss these questions and the depth and sophistication with which they should be pursued.

Second, data elicited from the survey are used to evaluate previously existing information from the village census and property records. Theoretically, every village administration keeps records of individual household composition and property holdings. These are summarized in standard forms and submitted to the kecamatan administration. This information also serves as the primary source of data for kabupaten and provincial censuses. In general, it is not possible to assess the reliability of these records (and to determine their usefulness in identifying and developing profiles of potential new project sites) since other data does not exist. Data from the Pukdale demplot survey, however, can be compared to village census records in order to provide some indication of the accuracy of government census information. Wherever relevant, data on each household in the demplot survey are juxtaposed to comparable information from the village census. Discrepancies between these two sets of data are discussed, since the reasons for these discrepancies are likely to be applicable to data from other proposed project areas in Timor. Data from the village census data also are compared with information from the kecamatan wherever the latter is available. Based on an evaluation of the reliability and availability of village census data and other existing information, the consultant's final report will offer recommendations for using this material in order to facilitate village data collection.

II. Pukdale village - General background

Location

Pukdale is situated 33 kilometers northeast of the provincial capital, Kupang. The village lies in the 22,600 hectare Oesao plain, which is a major agricultural production area. The village is bounded on the north by the main road that runs through the central part of west Timor and connects Kupang with the eastern part of the island. Public buses and trucks traverse this road frequently. In addition, public mini-buses drive in and out of Pukdale in the mornings to transport villagers to market centers that are located within 10 kilometers to the east and west of Pukdale. Thus, villagers are afforded relatively easy access to the Kupang and to market towns along the main road.

Physical characteristics

Timor is one of the chain of islands that form the Outer Arc of the Lesser Sundas. In contrast to Java, Bali, and other volcanic islands of the Lesser Sundas, Timor is subject to extreme conditions that have promoted swidden agricultural practices that lead to serious problems of erosion and soil loss. These conditions include: a short, irregular wet monsoon season with low overall rainfall; a prolonged dry season, often initiated by tropical cyclones and dominated by a dry westerly wind; and a limestone base with impermeable, erosion-prone marginalitic soils that suffer extreme desiccation during the long dry season.¹ Much of the island is covered by steep rolling hills and mountains and a rugged savannah of palm, eucalyptus, acacia, and cemara trees and open grassland.

The Oesao region, in which Pukdale is located, is one of a number of alluvial plains on the island. It is one of the more productive agricultural areas on Timor, despite such limitations as uncertain rainfall (as discussed in the following section), long periods of drought, low sophistication of irrigation techniques, and the quality of the soil. The soil in the Oesao area is characterized by a high clay content. It is calcareous, very hard when dry (forming deep wide cracks during the dry

¹ See p. 18 and passim James J. Fox. *Harvest of the Palm: Ecological Change in Eastern Indonesia*. Cambridge: Harvard University Press, 1977.

season) and sticky when wet.²

As will be discussed below, these properties of the soil make preparation of land for planting a difficult task. Farmers generally wait until the annual rains have flooded their land and softened the soil. Customarily, they rent a herd of 30 or more cattle to trample or "puddle" (rencah) their land to break up the soil. Within the past decade some individuals have purchased small tractors which they rent out for land preparation. Tractor rental is expensive, however (ranging from Rp.100,000 to 125,000 per hectare) and the tractors frequently break down and remain unrepaired for months at a time.

Attempts by the Government to introduce cattle drawn ploughs have not been successful in the Oesao area. This is due partly to the power of wealthy cattle and tractor owners who stand to lose an important source of income if individual farmers used ploughs. Equally important, however, are problems associated with the local soils and climate. By the end of the dry season, cattle generally are thin and weak due to the lack of food and water and are not strong enough to pull ploughs through the heavy soil.

Climate

The climate in western Timor is characterized by a long dry season with heavy winds. The mean temperature in the Kupang area ranges between 25° and 28°C. The arrival of the west monsoon between early November and late December marks the onset of the rainy season. This usually lasts until early April when the winds shift and the east monsoon reaches the region. The rainy season is characterized by intermittent periods of intense rainfall with hourly precipitation rates exceeding 100 mm. The periods between rainfalls often are long and result in drought. Little rain falls between April and mid to late November.

Ideally, farmers in the Oesao area plant one crop of paddy rice during the wet months. Sceptical of false starts to the rainy season, farmers generally do not exploit the earliest rains to prepare their land for planting seedbeds. Rather, they wait until middle or late December before they decide whether the season's rainfall will be adequate to support a rice crop. This often means that the rains stop before the end of the growing season and the crop yields suffer.

Reliable rainfall data is not readily available due to a lack of equipment and personnel to collect this information. In addition, rainfalls throughout the kabupaten are not uniform, so data collected in one area may not be applicable to another.

² For a detailed description of soil properties see Brian Carson. Soils of West Timor. Masters thesis, The University of British Columbia, 1979. Also see Timor Island Water Resources Development Study. Crippen International, 1980 (for Canadian International Development Agency), Volume 7 (Geology).

Information available from Department of Public Works and Department of Agriculture offices at the Kabupaten level is an average of data supplied by their various collection stations throughout the region.

With respect to rainfall in Pukdale there are two collection stations located within 4 kilometers of the demplot. One is the agricultural extension office located in the adjacent village of Naibonat about 1 kilometer from the demplot. Data collected at this site is not entirely reliable, although it is the source of the Department of Agriculture's rainfall information for the Oesao area. Rainfall is not monitored consistently by the same individual and information is not collected at the same time every day. When we asked to see their records, we found that they were not up to date.

On the other hand, rainfall measurements collected by a P3SA (Water Resources Division of the Department of Public Works) staff member in Babao (4 kilometers from the demplot) is collected consistently and carefully. His records are organized and up to date. Annual rainfall for the years 1980-1985 are listed in Table 1 under the Babao column.

According to the latter's records, yearly rainfall over the past 10 years has ranged from 1134 mm. over 62 days in 1985 to 2112 mm. over 88 days in 1978. Average rainfall for the decade was 1486.5 mm. over an average of 74.5 days. Monthly rainfall in Babao is listed in Annex A.

Rainfall data also was collected from the agricultural extension office in Naibonat and from Department of Public Works' meteorological station located near the Kupang airport in Penfui, about 20 km. from Pukdale. Data for the years 1980-1985 was available from both places.

Annual rainfall information from these sources are compared with the Babao data in Table 1. Monthly rainfall data from the three sources are presented in Annex A.

Table 1

Annual rainfall recorded at 3 sites in Kabupaten Kupang 1980-1985

	<u>Babao</u>		<u>Naibonat</u>		<u>Penfui</u>	
	mm	days	mm	days	mm	days
1980 -	1530	72	1981	67	1843	77
1981 -	1728	88	2196	92	2238	114
1982 -	1171	54	1341	59	1101	70
1983 -	1193	75	2510	78	1628	88
1984 -	1747	78	1564	85	1904	103
1985 -	<u>1134</u>	<u>62</u>	<u>2039</u>	<u>63</u>	<u>892</u>	<u>65</u>
Average:	1417	71.5	1938.5	74	1601	86

The discrepancies between these sets of data demonstrate that rainfall information from the Kabupaten of Kupang, regardless of the source, should not be regarded as representative of the entire region. Rainfall levels vary throughout the area and the accuracy of the information itself is questionable. Given the conditions under which the above information was collected, it is likely that the Babao and Penfui data are more accurate than that from Naibonat. This is unfortunate, since Naibonat is closer to the Pukdale demplot than the other sites and would be the most likely source for demplot rainfall information (since this data is not collected at the demplot itself).

Population

The population of Pukdale is homogenous. 99% of the villagers are ethnically and linguistically Rotinese and belong to GMT (Gereja Mesehi Injili Timur), the principal Protestant denomination in NTT. They are the descendents of settlers who were brought by the Dutch in the early nineteenth century from the nearby island of Roti to the Oesao area.³ The remaining 1% of the village population is comprised of two Timorese families, one Muslim and one Roman Catholic.

There are 348 households in the village, of which 92% (321)

³ See Fox (1977), especially chapter five, for a detailed description of the historical context and development of Rotinese settlements in western Timor.

are headed by males and 8% (27) by females, according to the 1984-1985 village household census. The total population of the village is 1673 (875 male, 798 female). Average household size is 4.8. Approximately 16.7% of the total village population is under 5 years old, 34% are ages 5-18; 36.6% are 19-49, 12.7% over 50. (See Annex B: Pukdale Village Demographic Survey for more detailed demographic information. This includes a breakdown of the population by age, sex, educational level, and occupation.)

Economic status and activities

The socio-economic status of residents of the Oesao plain, in which Pukdale is located, is relatively high compared to that of residents of other regions of Timor. According to the 1980 Crippen report,⁴ the average per capita income in Oesao was the equivalent of US\$132 which was 380% to 550% higher than per capita incomes in 11 other principal agricultural regions throughout Timor. In Pukdale and throughout the Oesao plain, the primary sources of subsistence and income are rice and corn farming and animal husbandry (mainly pigs and cattle). Wealth and prestige are derived from ownership of large herds of cattle and, to a lesser extent, swamp buffalo. Other prestige factors include ownership of large amounts of agricultural land (e.g., five or more hectares of paddy fields), rice mills, and vehicles; house type (concrete floor, masonry walls, zinc roof); and children's advanced education (i.e., sending children to Nusa Cendana University in Kupang or to a university in Java).

Village records indicate that there are three rice mills, three trucks, eight motorcycles, and ten tractors owned by Pukdale residents. Of this property, the family of the village head (which has land in the demplot) owns one rice mill, one motorcycle, three tractors, and one truck. With respect to house type, approximately 9% of the houses in the village are considered permanent (permanent, i.e., concrete floor, masonry walls, and zinc roof), 25% are semi-permanent [semi-permanent, i.e., lower half of walls are masonry, upper half are bebak (the stalk of palm fronds widely used throughout the region as a building material)]; and 66% are darurat (temporary, i.e., bebak walls). Semi-permanent houses may have dirt or concrete floors and either thatch or zinc roofs. Temporary structures usually have dirt floors and thatched roofs. (Patterns and distribution of land and cattle ownership are discussed in detail in the sections on land use and ownership and on livestock management below.)

According to the Pukdale village household census, 95% of

⁴ Timor Island Water Resources Development Study Final Report, June 1980. Prepared by Crippen International Ltd. (North Vancouver, B.C.) for the Canadian International Development Agency (CIDA).

all male heads of household (306 men) list farming as their principal occupation. The remaining 15 heads of household also engage in farming, however their principal sources of income derive from their work as teachers in the village elementary school, drivers (of tractors, trucks or minibuses owned by other villagers or by businessmen in Kupang and Oesao), civil servants, a minister in the village Protestant church, a fisherman, and a trader. The occupations of women are not listed except in the case of two school teachers. 128 male household members above the age of 16 are listed as farmers, one man is registered as working for a private business and another is listed as a preacher/evangelist. (See Annex B for a complete list.)

These occupation figures from the village census are misleading in two ways. First, they are not consistent from one household to another, such that not all young men who work as farmers are registered. Second, the census does not reflect the fact that women share farming responsibilities with the men in their households. Significantly, 92% of the women whose households own land in the demplot responded that they were farmers when asked to state their occupation.

Labor allocation is relatively flexible in the agricultural sector. Men and women grow vegetables and tree crops in gardens adjacent to their homes and/or elsewhere in the village. Generally, women sell the produce or trade it in the market for food, soap, and other household necessities. All tasks associated with rice and palawija (secondary crops - especially corn) production are conducted by men and women working on their own lands or as sharecroppers. Applying insecticide is the only exception, being a task undertaken primarily by men. Those households that own ricefields larger than .5 to 1.0 hectares generally hire laborers from the neighboring kecamatan of Kupang Tengah to harvest their rice, paying them with a share of the yield. Small livestock kept near the house (pigs, goats, and chickens) are tended by all members of the household, while men are responsible for cattle, water buffalo, horses, and other livestock that are kept elsewhere or roam freely.

Men and women earn supplementary income by making and selling tikar (palm leaf mats). Women sell or trade homemade coconut oil to help meet weekly household needs. In addition, some village men earn cash as occasional unskilled construction laborers, as middlemen in the cattle trade, by gathering and selling bebak (used locally for house construction), and by cutting and selling banana stalks (used to feed export cattle on the voyage to Java).

Educational background

In most households throughout the village, the primary language is Rotinese. Nonetheless, over 90% of the villagers are fluent in Indonesian, and virtually all of the remaining group understand and speak a rudimentary form of the national language.

There is one elementary school in Pukdale, and an additional elementary school and a kindergarten are planned. Older students go to junior and senior high school in either Oesao or Kupang. 399 members (70%) of the population between the ages of 6 and 19 are listed as students in the village census. 155 members (9%) of the population over the age of 13 are listed as illiterate. There is no active adult education or literacy program in this village. (Annex B contains a breakdown of educational levels by age and sex)

Formal and informal leadership

Pukdale was administered originally as a hamlet of the village of Oesao. In 1962 it split from Oesao and became a village in its own right. Since then, it has had only two village heads, both of whom are members of relatively wealthy families in the community.

The first, Eklopas Fangidae (who owns .38 ha. or 5% of the land in the demplot), was the top government official in Pukdale before it became independent and then served as the village's first head for 15 years. He continues to be an important member of the community and takes an active interest in its ongoing development. He and other older members of his and the other prominent families - regarded as elders (tua adat) - play a major role in the village as informal leaders. In many cases, these elders control access to large plots of land, to cattle herds, and to tractors owned jointly by extended families. They also coordinate and provide advice in carrying out weddings, funerals, reception of important guests, and other traditional prestige-enhancing ceremonies that play a central role in village life. While they have no official role in communal village or government projects, their participation in or approval of such activities is a key factor in projects' long-term success.

The current village head, Z.H. Ingunau (whose family owns the second largest parcel in the demplot⁵) will reach the end of his second five year term next year; and he says he will step down at that time. He is a young man (mid-30's) whose authority in Pukdale is based upon his wealth and upon the prestige of the position of village head. In contrast, the authority and respect commanded by the first village head derived from his status as an elder, his long service to the community and his role in securing its independent status. The current village head has governed Pukdale almost singlehandedly, delegating very little responsibility to other village officials. Unlike the first village head, the current leader is not likely to play an ongoing role in

⁵ This family owns 11% (.78 ha.) of the demplot. The largest parcel, 17.9% of the demplot (1.25 ha.) is owned by the father of Frans Fangidae, the pump operator, and Filmon Fangidae, the head of the water users association (P3A).

village government affairs when he leaves office. By his own admission, he plans to expand his interests in rice and cattle production. With respect to village projects (such as the existing and planned demplots in Pukdale), it is especially important that the implementing agency (in this case, P2AT) involve more villagers and local officials in site selection, discussion of village commitments and responsibilities, and so on to help ensure that the projects will continue regardless of who holds the position of village head.

Theoretically, according to the national standard the village is administered by the head, a secretary and three administrative chiefs (kepala urusan) for: government matters (pemerintahan), development (pembangunan), and treasury (keuangan). Specific programs are administered through the LKMD (Lembaga Ketahanan Masyarakat Desa or "village resiliency council") which also is intended to assist the village head in an advisory capacity. (See Annex C: Village Administrative Structure.) In fact, however, the LKMD has not been active in Pukdale under the administrations of either village head. It is significant to note that one subdivision of the LKMD, the PKK (Program Kesejahteraan Keluarga - "program to promote family prosperity and wellbeing") is inactive. At the village level, the PKK is headed ex officio by the wife of the village head and its activities are intended to involve and/or benefit all village women. Elsewhere in the region, PKKs promote family nutrition projects, home gardens, small livestock projects, small-scale credit schemes, and so on. In Pukdale, however, there are no PKK activities or other village-wide programs involving women; and the wife of the village head plays no apparent role in village affairs.

For the purpose of local level administration within the village, Pukdale is subdivided into five hamlets (dusun). These are further divided into six sub-hamlets (rukun kampung) and subdivided again into twelve neighborhoods (rukun tetangga). Each of these divisions has its own elected head. In general, these local leaders do not initiate activities or play an active leadership role in the community. Rather they respond to orders from the administrator directly above him in the village structure to coordinate cooperative village work projects, collect census information, make announcements, and so on.

Land use and ownership

The village itself comprises 5600 hectares, of which approximately 600 hectares is occupied by the four rivers and primary and tertiary roads that pass through Pukdale. This also includes agricultural land that is owned by people from outside Pukdale. There are no available records regarding this absentee ownership, just as there are no records of Pukdale villagers' land holdings outside their own village. (This is discussed further below.)

According to village land registry, the distribution of use of the 5000 hectares of land in Pukdale for which there is specific information is as follows:

Table 2

Land use in Pukdale (as recorded in village land registry)

Settlements	212 hectares
Agricultural	202
Mixed gardens	65
Grasslands	4413
Building sites	100
Other uses	<u>8</u>

5000 hectares⁶

These categories are taken from a standard government form (see Table Annex D). They are interpreted by the Pukdale village administration somewhat differently from their literal meanings as explained below. In addition the categories referring to privately owned land do not correspond exactly with information obtained from the village household census which records land ownership as follows:

⁶ Adapted from the Monthly Village Land Registry which (theoretically) is compiled each month by the heads of each hamlet within the village. See Annex C for a copy of this form and an abridged translation showing land use for the village as a whole.

Table 3

Household Property Ownership
as Registered in the 1983-4 Property Census

	Total ha. owned	# of owners	As % of village households	Average # ha. owned/household
Sawah rice land	222.5 ha	161	46.3%	1.4 ha
Pekarangan gardens/ yard	116.02 ha	302	86.8%	.38 ha
Kebun mixed gardens	86.72 ha	138	39.7%	.63 ha

Household plots

The land described as "settlements" includes the yards and garden plots that are located adjacent to most of the households in the village. According to the most recent available village household property census, there are 116.02 hectares of pekarangan (yard, including home garden) adjacent to 86.8% of the homes in the village (302 of the total 348). The average yard size is .38 hectares. The difference between this figure and the 212 hectare amount cited above from the village land registry is the result of a difference in interpretation in the meaning of the categories. The term as used in the land registry includes all land around village households while the household census figure includes only that part of the yard that is planted.

Produce from these and the "mixed garden" plots described below is used for home consumption as well as sold or traded in the local Oesau or Kupang markets. Depending upon the water supply, the plots are used throughout the year to grow vegetables (e.g., eggplant, squash, greens, shallots, scallions, and chili peppers). Corn and, to a lesser extent, mung beans are grown as well, primarily for home consumption. These garden plots also may include stands of bananas and coconut and areca palms and kapok, jackfruit, orange, and other fruit trees.

The availability of water during the dry season varies from one part of the village to another. Usually, there is water in two of the rivers that run through the village and in an unknown number of springs throughout the year. Nearby residents carry water from these sources to their gardens. In the area of the P2AT demplot, all households have 3-6 meter hand-dug wells that supply adequate water for drinking, washing, and watering their gardens for 10-12 months of the year.

Rice land

"Agricultural" land refers to sawah (rice land). The village household property census (which was taken about one year after data was collected for the village land registry cited above) records 225.5 hectares of sawah. This is owned by a total of 161 households or 46.3% of the village. The average size of total individual household holdings is 1.4 hectares. According to the village secretary, the discrepancy of 23.5 hectares between the two sets of records can be attributed to the opening of some previously unused grassland areas to rice cultivation. This land is used for one crop of rice per year if rainfall is adequate. During the dry season the land lies fallow and is used for livestock grazing. It is important to note that the total sawah holdings of individual households usually are not contiguous; and, as will be discussed in more detail below, households may own sawah outside of Pukdale which is not reflected in the village census records.

Information from the village household property census is the most reliable of the existing data about Pukdale. This information is collected house-to-house by the local hamlet officials and supplied to the village secretary. Theoretically, this should serve as the basis for reports to higher levels of the government bureaucracy. In fact, however, information at the kecamatan level Bangdes ("village development") office which is taken from the 1983/4 standard Potensi Desa ("village potential") form indicates that there are 400 hectares of sawah in Pukdale. A similar form dated 1981 states that the village contains 1012 hectares of sawah.

These Potensi Desa forms also cite the average annual rice production level for the village as a whole. The 1983/4 form sets the amount at 3 tons (paddy) per hectare. The 1981 form shows 6 tons/hectare. The local agricultural extension office does not collect precise production data, but estimates that production is 3-5 tons/hectare in years of adequate rainfall. Their estimates usually are based on ubinan measurements. Theoretically, this system involves calculating the yield of .2 hectare, taken from the center of that hectare. According to the heads of local farmer groups in Pukdale, however, this is not a common practice. Rather, such measurements usually are taken only on agricultural demonstration plots or in the event of production competitions. Furthermore, the measurements are made at the most accessible sections of paddy fields, usually along the edges, rather than in the center.

Our estimates calculated from information supplied by the farmers themselves suggests that their gross yields are 600 to 2400 kg. of milled rice (or 1-4 tons of paddy rice) depending upon rainfall, whether or not they use fertilizer, degree of infestation by plant hoppers and other pests, and availability of labor at harvest time. Farmers' claims about harvest yields cannot be taken at face value, however. (The figures cited above have been appropriately adjusted). Generally, farmers do not cite gross yields since they calculate yields after outside

laborers have been paid. Thus, they cite their net yield in terms of gabah (dried, unhulled rice) after payment (in paddy) has been made to planters, weeders, and harvesters, and - if appropriate - shares of gabah have been paid to tractor owners and sharecroppers. (Specific information from demplot farmers on their rice production is discussed in detail in Part III below.)

While the village household property census contains the most accurate available information about sawah ownership within the village, it does not take into account the riceland that villagers own outside of Pukdale. As the subsequent discussion of demplot owners' property indicates, some villagers own sawah outside of the jurisdiction of Pukdale; and this information is not available in either the village, kecamatan, or higher level government records. The village secretary estimates that at least 30% of the villagers own land outside Pukdale. Among demplot owners - for whom we have specific information - all except one household own outside land. According to their reports, 46.75 hectares or 53% of the 88.15 hectares of sawah owned by demplot households is located in the neighboring villages of Oesao and Naibonat.

Gardens and orchards

"Mixed gardens" refers in general to plots of land located near water sources, often one or more kilometers from the owners' homes. According to the village household survey there are 86.72 hectares of such garden plots. These are owned by 138 households (39.7%) and average .63 hectares in size. Again, the village secretary attributes the discrepancy between the number of hectares listed in the household census and land registry (65 hectares) to the opening of new garden lands after the land registry was prepared. As in the home gardens described above, the "mixed gardens" are used to grow a combination of vegetables, legumes, and a variety of trees. Some households keep pigs, goats, and chickens in these garden areas as well. Many families erect small temporary houses on their plots so that one or more members of the household can tend to the vegetables and animals full-time. According to the household property census, there are 78 hectares of kebun or garden land in the village. Again, the village secretary attributes the discrepancy between this and the land registry's figure (65 ha.) to the recent cultivation of previously unused grassland.

The household property census presents data on ownership of banana, coconut, jackfruit, kapok, and cocoa trees. Of these only banana and coconut trees are considered productive by the villagers who sell or trade the fruits and coconut oil to cover household expenses. The areca (betel nut) palm is not included in the official census, although its nuts also are sold or traded regularly. The property census lists tree ownership as follows:

Table 4

	Total # trees owned	# owners	As % of village households	Average # owned/household
Banana (clumps)	5248	251	72.1%	20.9
Coconut	2378	228	65.5%	10.4
Jackfruit	506	113	32.5%	4.5
Kapok	1644	191	54.9%	8.6
Cocoa	238	16	4.6%	14.9

Grasslands

This category includes all palm forests, open pasture and other uncultivated land in the village. Its primary use is for cattle grazing. Throughout the year, cattle roam freely throughout these open lands; and then are herded, counted, and branded by their owners annually at the end of the dry season (September-November). In addition, for the past 20 years, people have been encouraged by the village head to clear portions of this land for agricultural use. Depending upon access to water and to the contours of the land, farmers either practiced swidden (slash and burn) agriculture (primarily for corn production) or turned grassland into sawah. Reportedly, up to half of the sawah in Pukdale was developed in this way. This practice is likely to stop, however. A newly announced regulation from the Forestry Department prohibits further destruction of the region's natural grass and forest lands.

Building sites

The categories "building sites" and "other" is a rough estimate of the land occupied by all buildings in the village. These include: 2 Protestant churches, 1 elementary school, the defunct village cooperative (KUD), the village office (under construction), 3 rice mill shelters, and all homes and associated structures (i.e., outhouses, kitchens, and storage sheds).

Ownership and acquisition

Ownership of the land classified as "settlements," "agricultural," "mixed gardens," and "building sites" is private. There are no formal deeds, however. Furthermore, individual parcels of land have not been measured officially by representatives of the agrarian affairs, agriculture, or tax departments.

Neither farmers nor village officials have standard measuring equipment, so their calculations of property ownership are not precise. This means that the figures cited from the village land registry and household property are approximate.

The most common means of land acquisition is through inheritance. In general, male siblings inherit equal shares from their fathers. (Customarily, women do not inherit land or other property. Rather, they are provided with jewelry, furniture, and other household goods when they marry, at which time their parents have no further formal obligation to them.) Most grown men are given usufruct (rights to and use) of the land they stand to inherit from their father prior to the father's death. This informal transfer does not appear in the household property records, however. Thus, the household property census is not entirely reliable as a record of individual households' access to productive land within the village.

Other methods of land acquisition include purchase and temporary or indefinite usufruct of state owned land. Current purchase prices vary widely (from under Rp. 500,000 to over Rp. 1,000,000 per hectare) depending upon the quality of the land, proximity to water sources, the urgency with which the owner must sell, the size of the plot being sold, and the method of payment (usually cash and/or cattle paid in full at the time of the transaction).

Access to state owned land is provided by the village head. As mentioned above, villagers have been encouraged to open up unused grassland and cultivable expanses of land within lontar and gewang palm forests, all of which comprise the category "grasslands" listed above. Ownership of this land is ambiguous. Those farmers who have opened up grassland plots and farm them from year to year become the de facto owners of this land. Other farmers may work only intermittently on state land or move from one plot to another depending upon rainfall and the proximity of rivers to the land.

Livestock ownership and management

Livestock ownership is an important feature of the culture and economy of Pukdale. Cattle and, to a lesser extent, swamp buffalo (Kerbau) are primary symbols of wealth and they play an important role in ritual events. These large animals are regarded as long-term investments, whereas smaller livestock such as chickens and pigs and goats are kept as a source of funds to meet regular household expenses.

According to the most recent village household property census (1984/5), the majority of households in Pukdale (291 or 72%) own one or more kinds of livestock and most of these owner households (82%) have combinations of 2 or more animals. (Annex E contains a list of these combinations.) It indicates that the most commonly owned animals either individually or in combination are pigs, chickens, and cattle. Taken together, this is a

practical combination in terms of the uses of each type of livestock and the labor required for their care.

For example, chickens (and/or) eggs are consumed occasionally, particularly on Sundays, on special family occasions or when there are guests. Also, they are sold off when income from agricultural products is insufficient to meet everyday household expenses. Chickens roam freely about household yards and require little care. Marketing eggs and chickens generally is the responsibility of women and children. Eggs sell for Rp 100 and chickens range from Rp1000 to 2500 depending upon their size.

Piglets also are sold to meet immediate household needs. Adult pigs may be kept for consumption but more commonly are sold off to cover children's school expenses, medical bills, and other contingencies. Piglets sell for Rp5000, while adults sell for Rp40,000 to 100,000. Pigs are kept either in pens near the household where the family as a whole shares the responsibility for their care or in garden land elsewhere in the village where they are tended by men and older boys.

Goats, like pigs, are kept for consumption and to cover household expenses. They are kept tethered near the household or in gardens elsewhere. They are rarely consumed by the household, but rather sold off in the local Oesao market or to buyers who come to the village. Prices range from Rp5000 for young animals to Rp15,000 to 30,000 for adults.

Ownership of large herds of cattle is an important status symbol in the community. In practical terms, cattle are kept as a form of savings to be sold off in case of emergencies or to be used to fulfil family ritual obligations. At marriage, the family of the groom must pay a brideprice (belis) of cattle (often 6 head) and/or money (usually about Rp350,000) in addition to numerous wedding expenses. Contributions from the groom's extended family are required by local custom so that one household does not bear the full burden of expenses. Cattle also are slaughtered to feed guests at weddings, funerals, and other ritual events.

Some families keep one or two head of cattle tethered near their home for fattening (sapi paron). A fattened adult of two or more years may sell for up to Rp.300,000. Other cattle are left to roam freely in the open grassland and wooded areas in the village. Once a year, usually at the end of the dry season, cattle owners (usually men and older boys) round up their animals to count them and to brand the calves that may have been born during the year. At this time of year the cattle usually are thin and undernourished due to the lack of pasturage. Since this is also a time of food shortages, villagers often are forced to sell off one or more head of cattle to buy rice and other foodstuffs. Under these circumstances, they do not expect to get more than Rp100,000 per adult head of cattle. In general cattle sales are conducted in the village itself. Buyers come into Pukdale with their own transport. This saves the villagers the cost of transporting their livestock to market. It also means, however, that the cattle are not weighed and the price is based

on an estimate set by the buyer.

Owners of large herds (30 or more) use their cattle to trample (rencah) their rice land in preparation for planting. They may also rent out their herds to other farmers for the same purpose. The usual fee is one-third of the rice harvest. A herd of 40-50 or more can trample one hectare of land within about 2 hours.

In the past, farmers also kept water buffalo. Prior to the introduction of cattle into Timor by the Dutch in the early part of this century, swamp buffalo were used as work animals. They remain a status symbol and are used for rencah by some farmers. Their numbers have decreased significantly, however. Farmers say that cattle are more manageable and also more marketable than swamp buffalo.

Villagers use horses for herding cattle and for traveling to their fields and gardens that are located in areas far from their homes. They are kept tethered near the household and their care is the responsibility of men and boys.

Table 5 presents data from the village household property census regarding livestock ownership. In general, the distribution of ownership is reliable, however the numbers of animals stated are likely to be lower than the actual amounts owned. As we learned from demplot owners, villagers generally under-report the number of cattle they own in an attempt to minimize their tax burden. In addition, they often adjust the numbers of all livestock to account for losses they assume they will suffer during the coming year. In the case of cattle, losses result from starvation, theft, and disease (primarily anthrax). Goats and chickens frequently are killed by village dogs. The most dramatic problem with chickens, however, is Newcastle disease which strikes the village nearly every year, killing off most of the chickens within a matter of weeks.

Veterinary care is available upon request from a kecamatan based veterinary health worker from the Livestock Ministry. He generally makes an annual visit to the village to provide cattle immunizations which are free of charge. If individuals summon him, however, he charges Rp1000 for each injection administered. Farmers are reluctant to spend this money on cattle that exhibit the symptoms of serious illness, since they feel that the animals will die whether or not medicine is provided. There is no vaccination or other prophylaxis available to farmers to combat Newcastle disease in their chickens.

Table 5

Livestock Ownership from Household Property Census

	# head	# owners	Average owned per household	As % of village households
Cattle*	2832	150	18.8	43.0%
Water buffalo	32	3	10.7	.9%
Horses	147	59	2.5	2.6%
Pigs	740	239	3.1	68.7%
Goats	227	44	5.2	19.4%
Chickens	1590	224	7.1	64.4%

*

Six households own a total of 1075 head of cattle or an average of 179 head per household. If this group is eliminated, the total number of cattle owned by the remaining 144 households (or 41.2% of the village) is 1757 or an average of 12 head per household.

As with the land ownership data provided above, untabulated village census records are more accurate than the data provided by the Kecamatan office with respect to the numbers of livestock and owners in the village. The Kecamatan lists the number of livestock holders as 379 (the total number of male and female household heads). It provides the following total:

Table 6

Village Livestock Holdings from Kecamatan Records

Cattle	704	Pigs	604
Water buffalo	30	Goats	58
Horses	100	Chickens	1610

The most serious discrepancy is, not surprisingly, in the number of cattle. The total tabulated from individual household records is four times that reported by the Kecamatan.

Corporate activities

Water management groups

All owners of rice land in the village are members, at least in theory, of one or more water management groups (known locally as subak). Their principal function is to coordinate repairs to irrigation ditches, repair fences, and to determine planting schedules such that water from the four rivers and one diversion weir in the village can be channeled efficiently. These are coordinated by the Public Works staff assigned to the kecamatan. The titular head of the organizations in the village is the village head, although each group has its own leader head and sub-group representatives. Usually the leaders call their groups together at the beginning of the rainy season to plan their activities. They meet as a group later in the season only if there are problems (i.e., with people channeling water into their fields out of turn).

Generally there is an obligatory annual membership subscription of Rp.750 or 10 kg. of dry unhulled rice (gabah) per hectare which is divided among the group leaders. An additional 25 kg. per hectare is assessed as a contribution to a group contingency fund to cover the cost of fence and irrigation ditch repairs. Theoretically a portion of 10 kg./Rp750 contribution is due to the kecamatan coordinator to be used as a fund for system repairs. Over the past five years, however, farmers have refused to provide this share to the local government since they do not feel that appropriate use has been made of the money.

Cooperative

In 1975 a village cooperative (KUD) that sold pesticide and fertilizer was established in Pukdale. It closed three years later, however, and has not been reinstated. Apparently, its failure was largely due to a problem of leadership. The original head was a resident teacher who moved out of the village and no one wanted to replace him as KUD head, despite the widely held opinion that the village farmers would be well served by having their own KUD. Some villagers occasionally purchase agricultural supplies at the KUD in the neighboring village of Naibonat; however they complain that goods are always very late in arriving at that cooperative. Other farmers purchase all supplies from stores in Oesao or from dealers in Kupang.

Farming groups

Beginning in 1978, local agricultural extension workers began setting up groups of farmers (kelompok tani) with whom they intended to meet regularly to discuss agricultural problems and ways of increasing crop yields. Of the six groups that were established, only three still meet. The current extension workers do not usually attend the meetings and provide little support in general to Pukdale farmers. The groups generally only convene about twice a year. Their primary activity is to discuss problems such as pest control and to exchange new seeds that

members have been able to acquire from relatives living in Java. The leaders of these groups are considered contact farmers (kontak tani) who can be used by the Agriculture Ministry as conduits of information and as motivators of other farmers. The leaders of these groups are, for the most part, the same individuals who head the water management groups. Indeed, the head of the demplot water users association is the head of the farmer group in his hamlet as well as the representative from his hamlet in the local Oesao River water management group.

III. Results of the Demplot Socio-Economic Survey

The survey of all 23 demplot owner households was designed to elicit information regarding: demographics; land ownership and use, farming practices, cropping patterns, yields, disposal of produce and labor allocation; livestock holdings, and management; ownership of other material resources; household budget, including expenditures, income, and decision making; and priorities for the expenditure of money in the household and in the village.

In the following discussion of the survey's findings, survey data is juxtaposed to information contained in the village household property census. This provides a good indication of the extent to which land and livestock holdings are under-reported in the official records. Demographic information contained in the village registry (i.e. number of household members and their ages and educational levels) was consistent with the consultant's findings. Discrepancies stemmed from births, deaths, and marriages that had occurred in the interim between collection of the two sets of data.

Demographic profile

The demplot is located in one of the oldest sections of the village in what is generally regarded as the center of village activity. Many of the demplot members are prominent members of the community. They include: the former village head, the parents of the current village head, officers of three village water management groups, a school teacher, the extended family of the head of the village school, the head of the local hamlet, and the heads of a hamlet kampong and neighborhood. As will be explained below, the demplot includes some of the wealthiest members of the community in terms of land and cattle holdings. With the exception of the school teacher, all male and female heads of demplot households stated farming as their occupation. Supplementary sources of income will be described in the section on household income below.

Household composition

Demplot households range in size from two to ten members, with a mean and average number of six. This is slightly larger than the average overall village household size of 4.8. The composition of the households is two or three generational with the exception of one home which is occupied by a couple who are in their 80's. 39% of the households (9) contain two-generational combinations of parents and children or grandparents and

grandchildren. The other 57% (13 households) consist of three generations.

The average age of the male heads of demplot households is 61 years. Six individuals (26%) are over the age of 70, while only three are under age 50. 50% of the demplot residents (71 of 141) are aged 20 or older; and 32% of the total number (45 individuals) are over the age of 50. The demplot group is considerably older than the population of Pukdale as a whole, of which only 13% are aged 50 and older.

Labor allocation will be discussed in more detail in the section on agriculture below. It should be noted at this point, however, that in all except one household of elderly individuals, there are resident children and/or grandchildren who help with household and farm labor; and in the exceptional case, grandchildren from neighboring households provide regular assistance. In addition, 100% of the demplot households generally employ outsiders (i.e., non-family members) to perform some or all tasks related to rice production.

Educational level

Given the age of the majority of demplot residents, it is not surprising that the level of literacy is lower than in the population at large. 52% (12) of the demplot owners are illiterate, while 17% of all demplot residents over the age of 20 are illiterate. The latter percentage compares to 8.8% illiteracy for the adult population of Pukdale as a whole. The average level of education achieved by adult members in the demplot is third year of elementary school. No members have studied beyond high school. On the other hand, all demplot parents with children of school age stated that they expect their children to finish junior high school and hope they will continue through high school as well. One household has a son in college in Java; while two others have children who expected to take examinations to enter Nusa Cendana University in Kupang within a year from the time of the survey.

All demplot residents understand and speak Indonesian, although the individuals over the age of 60 have only a rudimentary mastery of the language. The principal language spoken in all households is Rotinese or an idiosyncratic mixture of Rotinese and Indonesian. (The survey was conducted in Indonesian with no difficulty in 22 of the households. In one household a young member of a neighboring demplot family assisted the consultant by clarifying her questions and the respondent's answers.)

Resources

The primary sources of wealth among demplot farmers are rice land and cattle. The rice mill, three tractors, and truck owned by one demplot household as well as two tractors owned by other families all were purchased entirely or partly with money earned

from the sale of cattle and/or swamp buffalo. Additional funds were obtained as credit from a bank in Kupang. At the time of the survey, all of this equipment was inoperable due to major mechanical problems and would require significant outlays of cash for spare parts and repairs. Thus, at present at least, ownership of this equipment should be regarded as much as a symbol as a producer of wealth.

Land holdings

Table 7 below lists the land holdings of all demplot owners. It provides not only the amounts elicited in the survey, but also those available in the village household property census. In general people do not under-report the amount of land they own since this is common knowledge and clearly is known to the head of the farmers' neighborhood, who collects this information. Unless otherwise noted, the major discrepancies that occur are due to ownership of land (primarily sawah) outside of Pukdale which is not included in the village census. As is clear from the table, the discrepancies are significant. In 12 (52%) of the cases, the amount of sawah owned is under-reported by amounts ranging from .5 to 13 hectares. In these instances, the additional land is located in the neighboring villages of Oesao or Naibonat.

Since the village property census is collected on a house-to-house basis, this absentee ownership would not appear in either the Pukdale or the other villages' records. The information in Table 8 was obtained through the consultant's survey. There are three cases in which the census lists sawah holdings as greater than the amount reported in the survey. The discrepancies range from .37 to .90 hectares. Each farmer had a different explanation of these discrepancies: land had been transferred to a son, the census was in error, and only land which is consistently planted should be included in an account of property holdings. Inconsistencies in the other two categories of land holdings stem from a variety of factors. These include the explanations offered above as well farmers' uncertainty about how to classify some portions of their land holdings.

According to the survey data, the average demplot household owns 4.08 hectares of sawah; the mean holding is 3.1 hectares. The average for the village as a whole is 1.4 hectares. Taking the figures from the village census, the average and mean holdings of demplot farmers are 2.55 and 2.0 hectares respectively. If one assumes that reporting inaccuracies between demplot and non-demplot households are roughly consistent, then demplot households own a minimum of 30% more sawah than households in the village at large. Table 8 presents the average demplot and non-demplot holdings of all three land types.

Table 7

Land Ownership by Demplot Households

Ownership is listed according to information elicited during the consultant's survey (Sur) and that listed in the village household property census (Cen):

Household #	Land type (in hectares)					
	Sawah (rice)		Pekarangan (yard/home garden)		Kebun (garden/orchard)	
	Sur	Cen	Sur	Cen	Sur	Cen
1	20.00	7.00	1.40	1.50	2.00	2.00
2	6.00	5.00	1.00	.10	1.00	.02
3	1.00	.50	.04	.05	.25	
4	3.13	3.50	.50	.50	.50	.50
5	1.25	na*	.25	na*		
6	.75	1.50	.10	.10	.50	.50
7	1.00	1.00	.25	.25		
8	4.00	2.00		.25	1.00	.25
9	8.14	3.00		.25	1.00	.50
10	2.00	1.00	.15	.25	.50	.50
11	1.50	1.50		.25	.50	.50
12	4.00	1.50	.25	.25	.25	.25
13	5.00	2.50	.52	.25		.50
14	2.00	.50	.05	.05	.50	
15	5.00	3.00	.20	.25	2.50	.50
16	2.50	2.00	.50	.04	.50	1.00
17	1.50	5.00**	.18	.10	.50	1.00
18	2.00	2.00	.10	.10	.25	1.00
19	4.75	2.00		.25	1.00	.50
20	4.60	na***	.10	na	2.00	NA
21	2.62	na***		na	.50	NA
22	3.10	4.00	.25	.25	.50	.50
23	8.12	na***	.75	na	1.50	na

* This farmer is not listed in the property census because the land he works is technically the property of his widowed mother. Upon her death, this land officially will become the son's property.

** This landowner reported that his holdings have diminished because he has given his adult sons full rights to over half of his land and because he gave a creditor part of his land as collateral on a loan.

*** These landowners are former residents of Pukdale who have moved to neighboring Naibonat. They still maintain their holdings in the demplot and elsewhere in Pukdale.

Table 8

A Comparison of Average Land Holdings of
Households in the Demplot and in the Village at Large

<u>Land type</u>	<u>Demplot</u>		<u>Village</u>	
	<u>Sur</u>	<u>Cen</u>	<u>Cen</u>	
Sawah (rice)	4.08	2.55	1.40	hectares
Pekarangan (yard/home garden)	.29	.22	.38	"
Kebun (garden/ orchard)	.75	.44	.63	"

While it seems likely that demplot households, on the average, own more rice land than do other households in the village, differences in the other categories of land are more ambiguous. Inaccuracies in reporting, inconsistent interpretations of land types, transfers to other individuals, inconsistent measurement, and so on are likely to influence the data listed in the census. Furthermore, usage of garden plots is varied, such that the productive value of this land cannot be estimated according to the standards used in the case of sawah.

All land included in the demplot traditionally was used to produce one crop of paddy rice during the annual rainy season. It was left fallow during the dry months to serve as a grazing area for livestock. In general, this land has not been regarded as a primary source of subsistence or income, however. The demplot land owned by individual households does not comprise a major portion of their holdings in the majority of cases. For 22 (96%) of the households, their land in the demplot is one of two or more (non-contiguous) sawah holdings they own in Pukdale and/or in neighboring villages. Table 9 summarizes the sawah holdings of each demplot household. It shows the amount and percentage of the total that is represented by the sawah holdings outside of the village as well as the amount and percentage of the total that is represented by each household's demplot holdings. Table 10 further summarizes the information about demplot holdings by showing the relationship between demplot and total sawah properties owned by each household. As it indicates, the demplot holdings of over 61% of the households comprise 10% or less of their total sawah property.

Table 9

Sawah Ownership of Demplot Households

HH #	Total sawah owned (ha.)	Sawah outside Pukdale (ha.)	Sawah outside as % of total	Demplot Holdings	Demplot holdings as % of total
1	20.00	8.50	43 %	.60	3 %
2	6.00	1.00	17 %	.38	17 %
3	1.26	.50	40 %	.76	60 %
4	3.13	3.00	96 %	.13	4 %
5	1.25	1.00	80 %	.25	20 %
6	.75	.50	67 %	.17	23 %
7	1.00	.25	25 %	.20	20 %
8	4.00	1.50	38 %	1.25	31 %
9	8.00	5.00	63 %	.20	3 %
10	2.00	1.00	50 %	.15	8 %
11	1.50	.50	33 %	.20	13 %
12	4.00	3.50	88 %	.13	3 %
13	5.00	2.50	50 %	1.50	30 %
14	2.00	1.50	75 %	.06	3 %
15	5.00	2.00	40 %	.10	2 %
16	2.50	.50	20 %	.15	6 %
17	1.50			.18	12 %
18	2.00	1.00	50 %	.15	8 %
19	4.75	2.75	58 %	.25	5 %
20	4.60	2.00	43 %	.14	3 %
21	2.62	1.00	38 %	.20	9 %
22	3.10	2.00	65 %	.14	5 %
23	8.12	4.00	49 %	.10	1 %

Table 10

Relationship between Demplot and Total Sawah Holdings

<u>Demplot holdings as % of total</u>	<u># of households</u>	<u>% of households</u>
1 - 10 %	14	61 %
11 - 19 %	3	13 %
20 - 31 %	5	22 %
60 %	1	4 %
Total	23	100 %

Land use

The most significant indicator of farmers' potential subsistence and income levels is the amount of rice land they own or to which they have access. Farmers regard their holdings as adequate for subsistence if they own enough rice land to supply their family's consumption needs for one year and if they have enough livestock, vegetable gardens, and/or orchards to produce enough cash to purchase other foods and household necessities. They regard themselves as above subsistence level if they can produce a marketable surplus of rice and/or are able to save some of the proceeds from the sale of other agricultural products.

The following discussion provides a rough indication of the amount of land required to meet a household's needs. All demplot households serve rice as a staple for at least one or two meals a day if possible. They mix this with corn or eat corn alone if they have insufficient supplies of rice or lack the money to purchase it, however. In calculating their households' rice requirements, families generally include an estimate of the amount served to guests and the amount used for contributions or gifts to people they visit outside the village (or to outside visitors to their homes), to the church, and to extended family members for weddings and other events. While gifts of rice to outsiders may be regarded in objective terms as expendable, villagers in Pukdale do not view them as such. They generally opt to fulfil their perceived social and ritual obligations at the expense of their own family's consumption. Thus, their calculations of rice requirements should be taken as accurate.

Using the villagers' calculation, their rice requirement is .4 to .55 kg. (milled rice) per person per day or roughly .5 kg. These values emerged with such consistency that they could not be ignored. They were obtained through calculations of absolute consumption rates elicited in the survey and also conformed with respondents' estimates of yearly rice requirements.

A household of six members, for example, estimates that its yearly rice requirement will be roughly 1095 kg. As described in the general section on rice land above, Pukdale farmers' yields range between 600 and 2400 kg. (milled rice) per hectare depending upon agricultural inputs, crop damage due to pests, rainfall, and labor availability. To give a rough example of land requirements using the lowest yield estimate, a household of six that provides 100% of the labor for rice production would need a minimum of 1.8 hectares of sawah to satisfy its yearly rice requirement. In fact, all households report that they use outside laborers for some or all of the tasks involved in rice production and that they pay the laborers in harvest shares. Thus, depending upon the yield, the hypothetical land requirements could be even greater than 1.8 hectares for a family of six.

Ownership of sawah plays a central role in villagers' estimates of wealth. This is not surprising given the cultural importance of rice and the value villagers place on their being self-sufficient in the staple food. Nonetheless, the following analysis demonstrates that rice production is a costly and risky enterprise; such that ownership of rice land may not be an appropriate measure of villagers' wealth.

In this analysis, and throughout this report, the figure, Rp.350 is used as the approximate market value of milled Oesao rice. This is based on an average price over the course of a year of Rp.250-500 (Rp375) minus the cost of milling (Rp.25). At this price, the expected market value of one hectare of rice is Rp.210,000 - 840,000 depending upon the yield (600-2400 kg. milled rice/ha.). As Table 11 below indicates, potential land preparation, labor and input costs range between Rp.202,250 and Rp.711,500 (comparing the total minimum amount costs to the total maximum costs); and assuming that farmers must pay in cash or harvest shares for tractors or for cattle to prepare their land and for laborers to plant, weed, and harvest. It also assumes that they purchase fertilizer, insecticide, and seeds; although in fact farmers may have seeds saved from previous years and they may forego using fertilizer and insecticide in order to save money. Harvest shares to cattle owners, sharecroppers, and so on are always calculated after the harvesters have been paid in full.

Table 11

Minimum and Maximum Costs of Rice Production per Hectare

	<u>minimum</u>	<u>maximum</u>
1. Land preparation	Rp. 70,000	Rp. 280,000
2. Cultivation	40,000	280,000
3. Harvesting	52,500	87,500
4. Inputs	<u>39,750</u>	<u>68,000</u>
Total	Rp. 202,250	Rp. 715,500

Table 12 provides more specific information regarding the alternative methods available for each stage of rice production as well as the relevant costs in cash or kind that are involved.

Table 12

Methods and Costs per Hectare of Rice Production

	<u>payment in kind</u> (milled rice)	<u>actual cost</u> <u>or (market value)</u>
1. <u>Land preparation</u>		
Cattle puddling (payment = 1/3 harvest) or	200 - 800 kg.	(Rp 70,000 - 280,000)
Tractor rental		Rp 100,000 - 125,000
2. <u>Cultivation/tending</u>		
Sharecropped (payment = 1/3 harvest) or	200 - 800 kg.	(Rp 70,000 - 280,000)
Hired labor - payment in kind:		
- plant	150 - 200 kg.	(Rp 52,500 - 87,500)
- weed/tend or	150 - 200 kg.	(Rp 52,500 - 87,500)
payment in cash:		
- plant		Rp 20,000 - 30,000
- weed/tend		20,000 - 30,000
3. <u>Harvesting</u>		
Hired labor (60 - 100 person-hours/ha @ 2.5 kg milled rice/ person-hour)	150 - 200 kg.	(Rp 52,500 - 87,500)
4. <u>Inputs</u>		
- fertilizer (300 kg/ha @ Rp 100/kg)		Rp 30,000
- insecticide (1-2 ltr @ Rp 1000 - 4000)		Rp 1,000 - 8,000
- seed (25 - 30 kg @ Rp 350-1000/kg)		Rp 8,750 - 30,000

Two of the possible labor and payment arrangements are described below. The first one reflects the growing reliance on tractors rather than cattle to prepare sawah for planting and provides an indication of the ways in which rice production is becoming monetized. The second one is more typical of the system used in the past.

- 1) - Pay for tractor rental, fertilizer, and insecticide in cash (use seed saved from previous year):

	<u>minumum</u>	<u>maximum</u>
tractor	Rp 100,000	Rp 125,000
fertilizer	30,000	30,000
insecticide	<u>1,000</u>	<u>8,000</u>
Total	Rp 131,000	Rp 163,000

- Pay harvesters in kind: 50 kg 250 kg

- Provide one-third of the preliminary net yield (after harvesters been paid) to sharecroppers:

(min: 600 kg minus 250 kg / 3
max: 2400 kg minus 150 kg / 3): 117 kg 750 kg

- Landowner's net yield is:

[min: 600 kg minus (250 + 117)
max: 2400 kg minus (150 + 750)]: 133 kg 1500 kg

@ est. market value Rp 350/kg: Rp 46,440 Rp 525,000

minus cost of tractor rental
and inputs: -Rp 84,560 Rp 362,000

By this arrangement, the landowner shares to some extent with a sharecropper the cost of harvest labor as well as the risk of poor annual harvests. The landowner alone, however, covers other fixed costs (tractor and inputs) after the sharecropper has received his one-third share of the preliminary net harvest. Comparing the alternative possibilities for labor for cultivation (listed under #2 of Table 12), it is clear that the estimated cost of sharecropping is higher than that of hiring wage laborers. On the other hand, many farmers prefer to use sharecroppers rather than daily laborers particularly if they are short of cash and do not want to sell off livestock or other

property to obtain money to pay wages. In addition, sharecroppers generally are more reliable. Sharecroppers often work the same farmers' plots year after year; and, since their compensation is based on the success of the harvest, they have an incentive to work effectively. Wage laborers generally come from the neighboring kecamatan of Kupang Timur and are ethnically Timorese. Sharecroppers tend to live in the Oesao plain area. They are more likely to be Rotinese (like the Pukdale farmers), and often are members of the landowner's extended family.

2. - No inputs used.

	<u>minimum</u>	<u>maximum</u>
- Pay harvesters in kind (as above):	117 kg	750 kg
- Provide 1/3 share of net harvest each to cattle owner and sharecropper, so that landowner's net is -		
[min: 1/3(600 - 117)		
max: 1/3(2400 - 750):	161 kg	550 kg
@ est. market value:	Rp 56,350	Rp 192,500

Since there are no capital costs, this arrangement is especially desirable for landowning households that do not have access to cash. Because it spreads the risks of production three ways, it is desirable also during years of uncertain rainfall when the prospects of a successful harvest are dubious.

It is not possible to make such elaborate production cost and profit estimates for other types of productive land (i.e., pekarangan - home gardens and kebun - garden and orchard plots located elsewhere). Farmers do not keep written or mental records of crop yields as they do for their rice harvests (in order to calculate the division of wages and shares). Furthermore, yields and their values are contingent upon such variables as the types of crops and trees planted and the availability of labor. Thus, for example, one demplot farmer can produce up to 6 kg. of chili peppers on .01 hectare. For three months of the year he is able to harvest 6 kg. per week. With an average farm gate price of Rp.750/kg., he receives Rp.4500/week or roughly Rp54,000 over the three month period. On his demplot parcel, during the same three month period he produced 400 ears of corn on .01 ha. at a farm gate price of Rp.50/ear or Rp. 20,000.

Rice production and disposal

It was possible to obtain relatively complete retrospective information on the 1983-4 and 1984-5 rice crops. Farmers can state the amount of land planted and the costs in kind or cash of labor and inputs (fertilizer, insecticide, and seed) as well as information about the disposal of the crop. All except three of the demplot households had written records of their harvest yields, usually by amount of daily harvest. They keep this in order to facilitate the division of rice shares at the end of the season. In all cases, the harvest information did not include the amount of paddy rice paid to the harvesters. Thus, in calculating production levels, we had to ascertain and add the amount paid to laborers prior to the division of the harvest.

Since 100% of the farmers could not recall with confidence all information relating to previous cropping seasons, the consultant elicited full data on two years only. Nonetheless, all of the farmers complained that these harvests were well below their standard due to shortages of rain for the past three years. They stated that the last good harvest came at the end of the 1981-2 season when rainfall levels from November to March were consistently high. (See Annex A.) For those 13 farmers who recalled with some confidence their yields of that season, the yields were between 20% and 500% higher than those of the 1983-4 and 1984-5 seasons. (That data is not included here since it is neither complete for all demplot households nor entirely reliable from those who provided it.)

Table 13 summarizes rice production and disposal information for the last two seasons. For each household, the 1983-4 data is listed on the first line and the 1984-5 (in bold face) data on the second. All rice amounts are listed in kilograms of milled rice, converted at the rate of .6 kg. milled rice to 1 kg. of dry paddy. (This figure conforms to farmers' own claims and information from the local Ministry of Agriculture office that cite the conversion rate at .5 to .7 kg.).

The first five columns in the table present actual information on yields, labor shares, monetary costs of labor and inputs, and amounts consumed. The term "consumption" refers not only to rice actually eaten, but also that which is used for contributions to family, church, and so on and that which is kept for seed for the next season. The market value used was Rp.350/kg of milled rice (as explained above). The "available to sell" category includes actual amounts of rice sold and surpluses saved for consumption and seed in the following year. The net profit and loss values are theoretical rather than absolute amounts, since they reflect the amount households would have earned (or lost) if they had sold all their net harvest rather than consuming part or all of it.

Only six of the households produced enough rice during both the 1983-4 and 1984-5 seasons to reach self-sufficiency (hh# 1, 2, 4, 5, 9, and 13). Nine households reached self-sufficient levels in 1983-4 only (hh# 3, 6, 8, 12, 14, 15, 16, 19, 21). Nine households (39% did not plant rice at all during 1984-5.

They feared that there would not be enough rain water to support a full cropping cycle since little rain fell in November and the heavy rains of the season did not begin until late December, by which time farmers normally have prepared, if not transplanted their seedbeds.

Table 13

Rice Production and Disposal for the 1983-4 & 1984-5 Seasons

Yr	HH	Land pltd (ha)	Gross Yield (kg)	Costs		Actual con- sumption		Avail to sell		Net profit /loss (Rp)
				Labor share	Labor, inputs (Rp)	(kg)	(Rp)	(kg)	Mkt value	
'84	1	18.0	23200	4300	1800000 ^T	1200	420000	18000	6300000	+4920000
'85		8.0	5400	1800	400000	1200	420000	2400	840000	+ 860000
'84	2	3.9	5900	1060	450000 ^T	1500	525000	3340	1819000 [#]	+1894000
'85		3.9	1800	300	150000	1500	525000	300	300000 [#]	+ 675000
'84	3	1.0	1300		149000	1300	455000			+ 306000
'85		--	--	--	--	--	--	--	--	--
'84	4	.6	490		32000 ^T	150	52500	340	119000	+ 612000
'85		.5	245		16000	150	52500	95	33250	69750
'84	5	1.25	1350	400	142000	400	140000	550	192500	+ 190500
'85		1.25	900	180	142000	400	140000	320	112000	+ 110000
'84	6	.75	720	340		380	133000			+ 133000
'85		.75	400	190		210	73500			+ 73500
'85	7	1.0	540	180	116500	350	126000			+ 9500
'85		1.0	405	135	106500	270	94500			- 12000
'84	8	4.0	3600		342000	2500	875000	1100	385000	+ 918000
'85		--	--	--	--	--	--	--	--	--
'84	9	2.5	1000		32000 ^T	500	175000	500	175000	+ 318000
'85		1.5	600			365	113750	235	82250	+ 196000
'84	10	--	--	--	--	--	--	--	--	--
'85		.5	216	72	5500	114	39900			34400
'84	11	.5	180		81000	144	50400	36	12600	- 18000
'85		--	--	--	--	--	--	--	--	--
'84	12	2.0	960	320	252000	550	192500	90	31500	- 28000
'85		--	--	--	--	--	--	--	--	--
'84	13	5.0	6700	2900	500000	220	77000	5580	1953000	+1530000
'85		1.0	1350	450	100000	220	77000	680	238000	215000
'84	14	2.0	900	300		120	42000	480	168000	+ 21000
'85		--	--	--	--	--	--	--	--	--
'84	15	2.5	2160	1440	21000	1000	350000	450	157500	+ 486500
'85		--	--	--	--	--	--	--	--	--
'84	16	2.5	2700	900	68000 ^T	1200	420000	1500	525000	+ 877000
'85		.5	150	30		65	22750			+ 22750
'84	17	.18	360	120		240	84000			+ 84000
'85		--	--	--	--	--	--	--	--	--
'84	18	.5	54	18		36	12600			+ 12600
'85		--	--	--	--	--	--	--	--	--
'84	19	2.0	1000	360		640	224000			+ 224000
'85		--	--	--	--	--	--	--	--	--
'84	20	.3	72	24	23000 ^T	48	16800			- 6200
'85		.3	60	20	23000	40	14000			- 7000
'84	21	1.5	1130	432	187000	698	244300			+ 57300
'85		1.0	864	576	137000	288	100800			- 36200
'84	22	.8	648	432		216	75600			+ 75600
'85		.8	576	384		192	67200			+ 67200
'84	23	2.0	1080	720	31000	360	126000			+ 95000
'85		2.0	1000	670	31000	330	115500			+ 84500

^T Indicates that the household owns or owns a share in a tractor. Labor cost in these cases include the price of fuel, driver's salary, and other operational expenses.

[#]This household planted sticky rice (ketan) as well as regular varieties. The market price of ketan is Rp.1000.

Tree crops

All of the demplot households own clumps of bananas and/or coconuts. The fruits are sold or traded in the weekly Oesao market for household necessities and food. In general, households that own 25 or more banana clumps reported that they earn Rp.1000-5000 (or the equivalent in trade) per week for at least three months of the year. For households with larger holdings, bananas are the primary source of cash for the purchase of weekly household necessities.

Coconuts are sold to buyers from Oesao and Kupang who come into the village with their own transport. 20 to 30 mature coconuts per tree are harvested roughly every three months. Prices range from Rp.50 to 100 per fruit. Households with ten trees or less use the coconuts primarily for home consumption. Over 70% of the households reported that they make their own coconut oil for their own consumption and/or for sale. A liter bottle of oil requires 4-5 coconuts and sells for about Rp.650. Women and older children produce and market the oil.

Although the village household property census lists jackfruit, kapok, and cocoa holdings in addition to those discussed, no demplot households reported selling the produce of these trees. Four households reported that they occasionally sell or trade the fruits of areca palms (for betel chewing). The maximum reported yield was the equivalent of approximately Rp.500 per week for two months of the year (or a total of Rp.4000). Roughly 40% of the demplot households reported owning 2 to 20 areca palms. In general they consume the fruits and give them as gifts to guests and relatives.

Table 14 compares demplot banana and coconut tree holdings as reported in the consultant's survey and the village household property census. As with other property, owners consistently under-report the numbers of their holdings by factors of 20% or more. The table juxtaposes the numbers of trees reported in the survey with the total amount of garden and orchard land (pekarangan and kebun) owned by each household according to survey data. Figures for household's total garden and orchard area were combined since most households combine vegetables, palawija or secondary crops (primarily corn) and productive trees on the same plots of land both adjacent to their homes and in other areas.

Table 14

Demplot Households' Tree Crop Holdings

[from the consultant's survey (S) and the village household property census (C)]

HH#	Bananas		Coconuts		Combined Pekarangan/Kebun (gardens/orchards)
	S	C	S	C	
1	150	100	200	160	2.40 hectares
2	500	100	500	69	2.00
3	50	50	10	8	.29
4	30	10	20	20	1.00
5	10	na	15	na	.25
6	10	5	12	8	.60
7	-	-	-	6	.25
8	50	10	25	15	1.25
9	100	50	140	30	1.00
10	20	10	10	2	.65
11	35	10	10	-	.50
12	40	5	15	6	.50
13	55	10	55	10	.52
14	2	-	-	-	.55
15	25	25	5	10	2.70
16	50	2	40	10	1.00
17	10	10	20	10	.68
18	-	25	5	5	.35
19	-	2	4	2	1.00
20	320	na	100	na	2.10
21	50	na	25	na	.50
22	25	25	-	10	.75
23	60	na	20	na	2.25

Survey average # bananas/owner household : 54
 " mean # " " " : 50
 Census average # " " " : 26
 # Owners as % of total : 87%
 Village average " " " : 21
 Village # owners as % of total : 72%

Survey average # coconuts/owner household: 58
 mean # " " " : 20
 Census average # " " " : 39
 # Owners as % of total : 87%
 Village average " " " : 10
 Village # owners as % of total : 66%

In the case of both types of trees, regardless of the figures used, ownership among demplot households is higher than the average for villagers as a whole.

Livestock holdings

Demplot households on the average own more livestock than other households in the village; and every demplot household owns at least one type of animal. The three largest cattle owners in Pukdale are residents of the demplot; as are two of the three water buffalo owners.

Table 15 below summarizes demplot livestock ownership as obtained from the consultant's survey and from the village property census.

Table 15

Demplot Household Livestock Ownership

[as reported in the village household property census (C) and in the consultant's survey (S)]

HH #	Cattle		Swamp buffalo		Horses		Goats		Pigs		Chickens	
	S	C	S	C	S	C	S	C	S	C	S	C
1	300	200	25	20	15	2	10	10	5	10	115	25
2	15	10	-	-	5	21	5	-	5	10	23	10
3	3	3	-	-	-	-	-	-	-	2	3	13
4	6	5	-	-	-	-	-	-	2	1	5	-
5	15	10	-	-	2	2	-	-	-	-	-	-
6	50	10	-	-	-	1	-	-	6	1	15	2
7	8	15	-	-	-	-	-	-	-	1	-	2
8	25	10	-	-	-	-	-	-	8	-	50	25
9	100	30	-	-	2	2	-	-	10	5	20	10
10	2	1	-	-	-	-	-	-	-	1	4	1
11	2	-	-	-	-	-	5	-	20	5	20	-
12	10	2	-	-	-	-	-	-	-	-	10	-
13	5	-	-	-	-	-	-	-	2	2	7	10
14	-	-	-	-	-	-	-	-	-	-	2	-
15	6	10	-	-	-	2	10	3	10	5	10	25
16	450	250	60	7	4	-	20	2	100	1	50	5
17	10	10	-	-	1	1	4	-	10	2	5	5
18	38	40	-	-	-	2	4	-	-	-	1	-
19	6	5	-	-	3	-	2	3	10	5	10	2
20	120	200	-	-	5	-	-	-	-	-	1	-
21	10	na	-	na	-	na	-	na	2	na	-	-
22	-	-	-	-	-	-	-	-	2	1	33	7
23	-	na	-	na	-	na	-	na	2	na	-	-

The most notable feature of this comparison between the two sets of data is the under-reporting of cattle in 62% of the cases for which both survey and census data is available. For the cases in which survey figures are lower than census data, farmers

provided plausible explanations such as: theft of animals, death due to disease, and sales and gifts or contributions of livestock in the interim between the time the two sets of data were collected. In the cases of large herds of cattle, it is clear that the numbers provided are estimates. All owners of more than five head of cattle claimed that they were not sure of the absolute numbers in their herds. They do not know how many animals have been born, died, or lost from year to year until they round them up for branding and counting at the end of the dry season.

The most unreliable data is that relating to chickens. In fact, during the period in which the survey was conducted, an epidemic of Newcastle disease swept through Pukdale and killed most of the chickens in the village.

According to the survey, 87% (20) of the demplot households own cattle, as compared with 43% of the village as a whole. The mean holding for demplot households is 15 head. If the owners of the four largest herds (of 100 - 450 head) are eliminated, 16 households own herds of 50 head or less. Their average holding is 14 head as compared to the comparable village-wide average of 12.

Owners of the two largest of the three swamp buffalo herds are demplot residents. 70% of the other demplot owners stated that they had owned herds of 5 to 100 water buffalo in the past but have sold them off over the past 4 to 20 years to pay for house construction, tractor purchases, ritual expenses, cattle purchases, and children's advanced education (in one case to a university in Java); or used them in payment of sons' or other male relatives' brideprice. The two remaining owners of swamp buffalo are the owners of the largest herds of cattle in the village. One uses them to trample his sawah; the other intends to trade his herd for cattle.

In addition to cattle, the other significant livestock holding among demplot farmers is pigs. 61% (14) of the demplot households own cattle, as compared with 69% of all village households. Average holdings among demplot members are 14 pigs (or 8 pigs if one owner's holdings of 100 are eliminated) whereas average holdings in the village at large are 3.

As in the village at large, demplot households attempt to keep large cattle as their primary form of savings and source of large amounts of cash (Rp.100,00 or more) for major emergencies or ritual events. Owners of the largest herds use their cattle for *rencah* on their own and others' land; so they are a source of income in the form of rice harvest shares for four of the demplot households.

Pigs provide them with a fund for occasional expenses such as elementary and secondary school fees and related education costs (from Rp.10,000 to Rp.75,000/person/year including clothes and depending upon the child's level); for tax payments (under Rp.5000 to over Rp.20,000 depending upon land and cattle holdings); for annual contributions to the local church (Rp.2500/person/year); and so on. Goats are kept for the same purpose,

although they are less popular than pigs. Farmers say that feed is difficult to find during the dry months and goats are damaging to garden crops if they are not properly tethered. (Tending goats usually is the responsibility of children who spend at least half of their days at school; and, when at home, may not pay proper attention to where the goats feed.)

Chickens (and eggs) provide a source of "luxury" food for guests and special occasions. They also supplement (or take the place of) vegetables and other agricultural produce that is sold or traded weekly to provide for basic household needs. Demplot owners are resigned to the fact that they may lose all or most of their chickens every year. If none survive, people often buy one or two chicks at Rp.500 to build up their stock again.

Housing and other material property

Homes owned by demplot farmers range from simple temporary structures of beak walls, thatched roof and dirt floor (of which there are four) to permanent buildings with masonry walls, concrete floors, and zinc roof (of which there are five). The other homes are considered semi-permanent or constructed; that is, constructed partly of masonry. As Table 13 below demonstrates, there are considerable differences in the values of houses within each category. This suggests that using type of dwelling as a measure of relative or comparative wealth provides only a rough indication. It is significant, however, that the percentage of temporary houses in the village as a whole is 66%, while in the demplot it is 17%. All demplot houses have a shallow three- to six-meter dug hand-well for drinking and washing water located in the adjacent yard; and all homes have detached cooking areas and outhouses. (It is estimated by village officials that over 75% of the homes in the village have their own hand-dug wells.) 56% (13) of the demplot homes have electricity. This service reached the village two years ago through a government-subsidized electrification project. The installation cost to each household was Rp.65,000.

In the case of tractor ownership, three (50%) of the owner households do so jointly with relatives. In the table, the number of tractors owned or the number of tractors in which a household has a share is listed in addition to the value of the tractors or the value of the shares.

Two households own pumps. Household #1 purchased a kerosene-powered portable centrifugal pump to be used specifically on his land in the demplot. Five years ago, a tubewell was drilled on his land under the auspices of a WHO-UNDP drinking water project. Since that time there has been no project activity there; no pump was provided; and the well was capped. This farmer decided to re-open the well in order to use it as a supplementary source of irrigation water for the demplot. He sold three head of cattle to purchase a Rp.500,000 pump.

The second pump, owned by household #23, was purchased on

credit (with 1% interest) through the Kupang branch of a Bank of Indonesia. It is a single-unit diesel-powered centrifugal pump that this farmer uses to provide river water to a small garden plot he maintains in Pukdale. He pays off the loan of Rp.1,000,000 in annual increments (Rp.30,000 to Rp100,000) depending upon the success of the variety of green vegetables and chili peppers he plants there.

It is significant to note that there are at least ten other farmers from Pukdale and the neighboring village of Naibonat who have obtained pumps in the same way; however no other demplot farmer is included in this group. All of these farmers plant chili peppers and vegetables on the small plots (less than .5 ha.) located along one of the two rivers in Pukdale that have water on a year-round basis.

The rupiah values listed in the table below are estimates based on the current purchase price of the materials and, where appropriate, labor involved in house construction; household goods, furniture, and so on, and agricultural equipment. In the cases in which household members own gold jewelry, this is included in the category labeled "furnishings value." [It should be noted that possession of gold is not regarded generally as a primary symbol of wealth. Most women own a ring and a pair of earrings (valued under Rp.50,000), which are regarded simply as jewelry to be worn. If they own a necklace or bracelet (worth over Rp40,000 or 50,000 per piece), they regard these items both as jewelry and as a source of emergency cash.]

As calculated in Table 16, the mean total value of demplot household's material property is approximately 2,100,000, using the standard measure of current market prices for the goods and materials owned. This standard was the only reasonable way of setting values since it would have been impossible to account for differences in price and inflation rates over the 1-40 year time span in which most of the houses were built and goods were purchased. No comparable data is available for the village or the region as a whole.

Table 16

Housing and Material Property

* Values are stated in million rupiah.

** Code to house types: P = permanent (masonry walls, concrete floors, zinc roof)
 SP = semi-permanent (partial masonry walls)
 T = temporary (palm stalk or bebak walls)

HH#	House type**	House value*	Furnish. value	Tractor # owned	Tractor value*	Pump Value*	Other	Value*	Total value
1	P	2.000	2.000	3	18.000	.500	Generator Motorcycle Rice mill	4.000 1.000 3.000	29.500
2	SP	.500	1.100	3 (share)	4.000		Share in hse in Kupang	.500	6.100
3	P	2.000	.925						2.925
4	SP	.150	.475	1 (share)	2.000				2.625
5	P	2.000	.915						2.915
6	SP	1.000	.350						1.350
7	T	.750	.725						1.475
8	P	4.500	2.000						6.500
9	SP	.500	.850	1	6.000				7.350
10	SP	.400	.200						.600
11	SP	1.250	.850						2.100
12	SP	.600	.550						1.150
13	T	.100	.800				Building perm hse	1.000	1.900
14	SP	.500	.075						.575
15	P	1.000	1.000						1.750
16	SP	.600	.650	1 (share)	2.000				3.250
17	SP	.800	.350						1.150
18	SP	2.000	.400						2.400
19	T	.100	.100						.200
20	SP	2.000	1.000	1	7.000		Truck Motorcycle	5.0 ¹ 1.0 ¹	16.000
21	T	.075	.450						.525
22	SP	.275	.450						.725
23	T	.400	.400			.300 ²			1.100

¹ Purchased for son

² Amount paid of Rp1,000,000 bank loan for pump purchase

The relative wealth of demplot households is best illustrated by comparing all major productive resources and income-generating property owned by each one. To place a total value on all resources, however, would be misleading. For example, land values are not uniform, primarily due to differential access to water. Furthermore, with respect to cattle, owners of large herds that roam freely for most of the year could not provide an accurate assessment of the distribution of age and sex in their herd population at the time of the survey. (The survey was conducted at the end of the dry season prior to the annual round-up of cattle, so owners were unaware of births and losses that had occurred over the course of the year.)

Land owned within the boundaries of the 7 hectare demplot represents a small portion (1-30%) of the holdings of nearly 96% of all demplot farmers. This land is used for paddy rice production, however only two of the farmers (who own .6 and about 2.0 hectares respectively) consider their yields from their demplot parcels to be significant. Until the introduction of the new irrigation system, these farmers did not regard their plots in this part of the village as major sources of income. Nonetheless, if their use of this land for dry season farming is successful, these parcels will become significant resources. Thus, in the following table showing the major resources owned by each demplot household, the category demplot land is included separately from the other sawah land with which it is normally classified.

Table 17 consolidates key information on amount of each household's land holdings (demplot, other sawah, and gardens/orchards), cattle ownership, number of productive trees, and income-generating property (tractors and pumps). It also shows the average and mean amounts for these categories (with the exception of tractors and pumps for which there are only six and two owners respectively). Households that are most secure financially are those that have large holdings in more than one category, since, theoretically, the risk of failure or loss of one set of resources can be offset by others. In fact all demplot households own land in each category; 87% of them own cattle; and 96% have productive trees (banana and/or coconut palm). Nonetheless the differences in the sizes of their respective holdings are significant; as is clear from the discrepancies between the mean and average amounts (particularly sawah, cattle and trees).

Table 17

Productive Resources and Income Generating Property

HH#	Demplot (ha)	Other Sawah (ha)	Gardens (ha)	#Cattle	# prod. trees	# of Tractors	Pump
1	.60	19.40	3.40	300	350	3	1
2	.38	5.62	2.00	15	1000	3 (share)	
3	.76	.50	.29	3	60		
4	.13	3.00	1.00	6	50	1 (share)	
5	.25	1.00	.25	15	25		
6	.17	.58	.60	50	22		
7	.20	.80	.25	8			
8	1.25	2.75	1.00	25	75		
9	.20	7.80	1.00	100	240	1	
10	.15	1.85	.65	2	30		
11	.20	1.30	.50	2	45		
12	.13	3.87	.50	10	55		
13	1.50	3.50	.52	5	110		
14	.06	1.94	.10		2		
15	.10	4.90	2.70	6	30		
16	.15	2.35	1.00	450	90	1 (share)	
17	.18	1.32	.68	10	30		
18	.15	1.85	.35	38	5		
19	.25	4.50	1.00	6	4		
20	.14	4.46	2.10	120	420	1	
21	.20	2.42	.50	10	75		
22	.14	2.96	.75		25		
23	.10	8.02	2.25		80		
<hr/>							
Avg:	.33	3.77	1.00	59	129		
Mean:	.18	2.75	.68	10	50		

Table 18 summarizes the information in Table 17. In order to assess the wealth of demplot owners relative to one another, the mean holding in each category is used as a standard. Households are ranked according to the number of categories in which their holdings equal or exceed the mean. (This information will be used after the re-survey of demplot households has been conducted to determine whether there is a correlation between relative wealth and demplot participation.) Table 18 also includes the age of each head of household, household size, and the total estimated value of each household's material property (home, furnishings, equipment, and so on - see Table 15). It might be assumed that there is a correlation between one or more of these variables and ownership of productive resources. As the table shows and as will be discussed further, this is not the case.

Table 18

Ranking of Households by Holdings of Productive Resources

Highest - above standard in 4 or 5 categories (demplot, sawah, and garden/orchard, cattle, and productive trees)

Middle - above standard in 2 or 3 categories

Lowest - above standard in 0 or 1 category

HH#	HH size	Tractor (#)	Age of hh head	Value of material property (in million rupiah)
Highest (26% of demplot households):				
1	7	3	63	29.00
2	9	3	59	6.10
8	10		61	6.50
9	4	1	68	7.35
16*	5	1	77	3.25
20	5		74	16.00
Middle (49% of total households):				
3	7		37	2.93
4	5	1	80	2.63
5	3		36	2.92
12	5		69	1.15
13	4		58	1.90
15	10		58	1.75
17	8		60	1.15
19	9	1	44	.20
21	6		55	.53
22	8		57	.73
23	5		50	1.10
Lowest (26% of total households):				
6	3		62	1.35
7	9		50	1.48
10	4		81	.60
11	5		56	2.10
14	2		77	.58
18	6		76	2.40

*Is above mean in only 3 categories but ownership of 450 head of cattle makes this household one of the wealthiest in the village.

The "highest" group in the table is distinct from the other two. It includes all the major cattle owners in the demplot. (They also are the owners of the largest herds in the village.) The value of their homes and other property is considerably higher than that of members of the lower groups; and tractor ownership is concentrated in this top group as well. This suggests that tractor ownership tends to accompany other forms of wealth rather than to supplant them. That is, farmers do not risk disposing of property unless they have sufficient reserves of cattle or other productive resources.

All of the individuals in the top group are prominent senior members of the community: #1 is the father of the village head (who was, himself, the head of his hamlet), #2 is the former village head, #8 is the father of the demplot pump operator and of the head of the P3A, #9 is the brother of #1 and #16 and #20 are brothers of #2. All of these men are regarded as "tua adat" (traditional elders) who are involved in local dispute settlement, organizing ritual events, determining brideprice, and so on. Thus, they have considerable influence in community affairs and may be instrumental in promoting the demplot.

The variables age and size of household were included in the table for reference, but they are not useful indicators of wealth. The mean age of demplot owners is 60 and only three individuals (13%) are under the age of 50. While these three households are ranked in the middle group, however older demplot members are distributed throughout all three groups such that further generalizations about age and wealth are irrelevant. This is complicated by the fact that all of the 87% (over age 50) depend to some extent on the labor and/or financial assistance of their children and/or grandchildren; and some have formally or informally distributed their livestock and land to their children. All except one (#14) of the 87% have one or more grandchildren and/or children living in their homes. This is a flexible and, often, a temporary arrangement, however, depending upon the age of grandchildren and the extent to which they are available to help their grandparents.

Household budget

Family finances are managed by the female head of household in every case in the survey. None of the male respondents in the survey keep more than a few thousand rupiah, at most. They ask their wives for money for cigarettes, liquor, and other stimulants and for car fare for trips to Kupang or elsewhere. Women are responsible for decision making about small regular purchases of food and household necessities and of clothing; payment of school fees and related costs; weekly contributions to the church offering; small gifts of food or money for other households' weddings, funerals, and so on; and most other transactions of Rp.10,000 to 20,000 or less. Husbands and wives

usually discuss larger purchases or trades of large livestock and other property, although it is men who usually conduct these transactions.

In general, women and children do the marketing one to three days each week, taking vegetables, bananas, or other produce to sell or trade in return for food and other household necessities. Sales of agricultural produce to buyers who come to the household are conducted either by the male or female head, except in the case of large livestock. In general, all aspects of cattle management, including sales, are the responsibility of men; and it is men who transact sales of pigs and goats. Money obtained from livestock sales is given to their wives unless it is to be used immediately for a purchase. One demplot household (#2) has a savings account of approximately Rp.100,000 in a bank in Kupang which they maintain for emergencies. In all other cases, all money is kept at home.

Expenditures

Table 19 shows demplot households' expenditures for the year preceding the survey, roughly June-August, 1984 to June-August, 1985.

Table 19

Demplot Households' Yearly Expenditures for 1984-5

(All amounts in million rupiah)

HH#	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Agric.																							
Labor	1.55	.05																					
Inputs	.72	.15	.05	.016	.042	.02	.016			.005					.021					.023	.037		.063
Tractor	.3	.2	.1		.1		.09		.01														
Ipeda tax	.067	.02	.007	.018	.01	.004	.005	.008	.02	.005	.01	.018	.007		.011	.02	.008	.005	.005	.02	.02	.006	.005
Sub-total	2.637	.42	.157	.034	.152	.024	.111	.008	.03	.01	.01	.018	.107		.032	.02	.008	.005	.005	.043	.057	.006	.068
Livestock																							
HH.																							
Food/sup.	.75	.54	.235	.16	.3	.24	.55	1.25	.2	.18	.26	.22	.25	.025	.195	.6	.024	.3	.11	.045	.3	.385	.105
Clothes	.15	.13	.065	.09	.1	.12	.27	.15	.075		.1	.025	.1		.085	.1	.095	.11	.025		.15	.075	.025
Electric.		.03	.018				.018	.24	.03		.018	.012			.018	.018	.03	.012		.03	.036	.024	
Sub-total	.90	.70	.318	.25	.4	.36	.838	1.64	.305	.19	.378	.257	.35	.043	.298	.73	.119	.422	.135	.075	.486	.484	.130
Education	.065	.05	.04	.096			.192	.145	.025				.02		.06		.065		.025	.1	.075	.07	
Contribu.																							
Church	.1	.25	.042	.03	.03	.05	.035	.125	.035	.028	.044	.05	.025		.04	.045		.02		.05	.04	.05	.042
Family	.075	.1	.25	.15	.03	.04	.05	.050	.05	.2	.01	.025	.015		.015	1.0	.001	.01		.025	.035	.03	.005
Sub-total	.175	.35	.292	.18	.06	.09	.085	.175	.085	.228	.054	.075	.04		.055	1.045	.001	.03		.075	.075	.08	.047
Medical	.02	.005	.005	.003			.02	.07	.085				.003		.003								.001
Recreat.																							
Stimulant	.4	.05	.05			.025		.07	.075	.025	.012		.018		.02			.012	.05	.022	.027	.025	
Transport	.05	.03	.02	.01			.05	.05	.02	.02	.01		.015		.02								
Sub-total	.45	.08	.07	.01		.025	.05	.12	.095	.045	.022		.033		.04			.012	.05	.022	.027	.025	
Other																							
TV tax	.025							.006															
TV purch.																.3							.03
Generator																							
(fuel)	.18																						
House purch.*																4.0							
Pump purch.	.5																						
Sub-total	.705							.006								4.3							.03
Total	4.952	1.605	.882	.573	.612	.499	1.296	2.164	.625	.473	.464	.35	.553	.043	.488	6.095	.193	.469	.215	.315	.72	.666	.285

*Home purchased for daughter and family in Kupang.

5

Table 20 summarizes the data from the preceeding table by presenting each category of expenditure as a percentage of the total expenditures in each household. As it shows, the principal regular expenses in demplot households are: 1) food and household necessities (including soap, cooking fuel, clothing, and minor household improvements); 2) agricultural costs (including labor, inputs, tractor rental, IPEDA taxes, and, in a few cases, tractor operations and maintenance); and 3) contributions to the local church and to the extended family for ritual events and emergencies.

Table 20

CATEGORY OF EXPENDITURE AS PERCENTAGE OF TOTAL EXPENDITURES

HH#	HH Size	% Agriculture	% Livestock	% Household	% Education	% Contributions	% Medical	% Recreation	% Other
1	7	53.3		18.2	1.3	3.5	0.4	9.1	14.2
2	9	26.2		43.6	3.1	21.8	0.3	5.0	
3	7	17.9		36.0	4.5	33.1	0.6	7.9	
4	5	6.0		43.6	16.8	31.4	0.5	1.7	
5	3	24.8		65.4		9.8			
6	3	4.8		72.2		18.0		5.0	
7	9	8.6		64.6	14.8	6.6	1.5	3.9	
8	10	0.4		75.8	6.7	8.1	3.2	5.5	0.3
9	4	4.8		48.8	4.0	13.6	13.6	15.2	
10	4	2.1		40.2		48.2		9.5	
11	5	2.2		81.5		11.6		4.7	
12	5	5.1		73.4		21.5			
13	4	19.3		63.3	3.7	7.2	0.5	6.0	
14	2			100.0					
15	10	6.6		61.1	12.3	11.3	0.6	8.1	
16	5	0.4		12.0		17.1			70.5
17	8	4.1		61.7	33.7	0.5			
18	6	1.8		90.0		6.4		2.6	
19	9	2.3		62.8	11.6	23.8		23.3	
20	5	13.6		23.8	31.8	23.8		7.0	
21	6	7.9		67.5	10.4	10.4		3.8	
22	8	0.9		72.7	12.0	12.0	0.2	3.7	
23	5	23.9	3.5	45.6	16.5			10.5	

Food and household necessities

This was the principal category of expenditure (60-100%) for 61% of all households; for another 26% they represented 21-50% of all expenditures. Regular and extraordinary household expenditures vary by month and from year to year depending upon the amount of cash available from agricultural produce. Expenditures on food are especially flexible. Households buy rice rather than corn if they have available cash, though the cost of rice is twice that of comparable amounts of corn. On the other hand, if their supply of rice as well as ready cash are limited, households may sell the rice in order to purchase corn, thereby doubling their supply of a staple food. The normal diet consists of either corn or rice as a base with the addition of bits of vegetables and chilis. Twenty of the households (87%) reported that they purchase small amounts of fish at least once a week (for Rp.250 to 1000) to supplement their meals. No families reported that they buy meat (beef, pork or chicken) regularly, however. Of the 17 (74%) households that reported buying meat at all, none of them purchase more than one kilo per month, regardless of the number of household members.

Agriculture

96% of the households had agricultural expenditures in 1984-5; although these were minimal compared to other expenses. Agricultural expenditures were probably lower than usual in 1984-5 because most farmers did not plant as much or any of the sawah they normally cultivate in years of more certain rainfall. For 65%, these expenditures were under 10% of the total money spent during that year; and for 35% of the farmers the only costs they incurred were taxes (on land, production, and cattle). For 26%, the amount spent on agriculture was 11-30% of their total expenditures. One farmer's agricultural expenditures constituted over 50% of his total expenditures. This was largely due to the fact that he had to pay cash to laborers for working 8 hectares of his sawah. In years of more certain rainfall, he explained, the laborers he hires usually accept all or partial payment of wages in kind. Table 21 provides a break-down of the percentile values of each type of agricultural expenditure.

Table 21

CATEGORY OF AGRICULTURAL EXPENDITURE AS PERCENTAGE OF TOTAL AGRICULTURAL EXPENDITURE

HH#	LABOR		INPUTS		TRACTOR		IPEDA		TOTAL million Rp
	million Rp	percent	million Rp	percent	million Rp	percent	million Rp	percent	
1	1.55	58.8	.73	27.3	.3	11.4	.067	2.5	2.673
2	.05	11.9	.15	35.8	.2	47.6	.02	4.7	.420
3	.	.	.05	31.8	.1	63.7	.007	4.5	.157
4	.	.	.016	47.0	.	.	.018	53.0	.034
5	.	.	.042	27.6	.1	65.8	.01	6.6	.152
6	.	.	.02	83.3	.	.	.004	16.7	.024
7	.	.	.016	14.4	.09	81.1	.005	4.5	.111
8008	100.0	.008
901	33.3	.02	66.7	.03
10	.	.	.005	50.0	.	.	.005	50.0	.01
1101	100.0	.01
12018	100.0	.018
131	93.5	.007	6.5	.107
14	0.000
15	.	.	.021	65.6	.	.	.011	34.4	.032
1602	100.0	.02
17008	100.0	.008
18005	100.0	.005
19005	100.0	.005
20	.	.	.023	53.5	.	.	.02	46.5	.043
21	.	.	.037	64.9	.	.	.02	35.1	.057
22006	100.0	.006
23	.	.	.063	92.6	.	.	.005	7.4	.068

In contrast to food, major agricultural expenditures are fixed. Respondents complained that the costs of rice production have increased significantly within the past five to ten years. This is due to the increasing use of tractors rather than renciah cattle to prepare land and to demands for compensation in cash by harvesters and other laborers. Five of the households reported that they never use fertilizer or insecticide to spare themselves those expenses; however the rest of the farmers say that these are indispensable (though they may not feel that they are able to afford them every year).

Tractor use requires ready cash (Rp.100,000 - 125,000 per hectare) at the time of rental. Households that are short of money and do not have (or choose not) to sell off cattle to obtain the necessary funds to hire a tractor claim that it is becoming increasingly difficult to find renciah cattle. As discussed earlier in this report, compensation for renciah always takes the form of a third share of the harvest and therefore spreads risks between the farmer and cattle owner. Given the uncertainty of crop production due to unreliable rainfall, infestation, and labor shortages, many cattle owners have abandoned altogether the use of their cattle for renciah. This is true for all of the tractor owners in the demplot survey who reported that they had sold off some of their herds over the past five to eight years in order to purchase tractors. (Tractor purchases in two cases were facilitated by credit options from the Kupang branch of Bank Indonesia.)

By local custom, agricultural laborers both within and outside of the family were paid in kind (see the section on rice production above). Over the past decade, as an increasing number of children have remained in school beyond elementary level, the household work force has decreased in size, and landowners have become more dependent on outside laborers to perform some or all agricultural tasks. Within the past five years, laborers have begun to pressure local farmers to pay them in cash to minimize the risk of insufficient compensation due to harvest losses.

Contributions to church and family

91% of the households reported making contributions to both church and family during the 1984-5 year. These are regarded as obligatory by all demplot families. In the event that they are short of money, they may provide rice and/or livestock as a substitute or supplement for cash contributions. For 61% of the households these contributions represented less than 20% of their total expenditures; for the remaining 39% these expenses constituted 20-50% of the total.

With two exceptions, every demplot household made contributions of Rp.5000 to over Rp1,000,000 to the local church and to members of their extended families for weddings and other ritual events. In the case of nine households that are part of the same extended family, a fixed contribution rate is set annually after an assessment has been made of the costs of members' weddings that will occur during the year. This includes not only money (from Rp.25,000 to Rp.100,000 per household) but also rice (usually 10 to 25 kilos per

event), and/or a head of cattle or a pig.

Education

65% of the demplot households reported spending money on children's education. For 26% of the demplot families, school expenses represented less than 10% of their total expenditures; for 30% the amount was 11 to 20%. Only two households reported that school expenses were over 30%. In theory, the total cost of supplies, books, clothes, and fees is considerable (an average of Rp.30,000 per child per year), however many families do not purchase all the required gear. Children are required to have at least two full sets of uniforms for school (at Rp.10,000 to 25,000 per set), but nine of the demplot families reported that they have not been able to afford more than one to one and one-half full sets per child. On the other hand, school fees are fixed and unavoidable. These range from Rp.1200/year for the young elementary pupils to Rp.7500/month for some senior high students.

Medical

Medical expenses were minimal for demplot households in 1984-5, although three households reported that each had spent over Rp.100,00 in Kupang on hospitalization, surgery, prescription drugs, and doctors' fees within the past four years. A village health worker (mantri) based at a military residential camp adjacent to Pukdale visits the village weekly, stopping at individual households that notify him that there is illness. He usually provides an injection and medicine for a fixed fee of Rp1,000. Villagers find this more convenient than visiting the health center in Babao though the total cost of care and transportation to the center is usually less than the mantri's fee.

Recreation

This category lists dispensable expenditures such as the purchase of stimulants and travel to Kupang for casual shopping or visiting. In 1984-5 78% of the households reported that they incurred these expenses. For 65% of the demplot households, recreational expenditures constituted less than 10% of their total. For 13% of the population, recreation contributed 10 to 25% of total expenditures. Consumption of stimulants is especially dependent upon available cash. Nearly all of the respondents over the age of 50 reported spending Rp.100-500 per week on tobacco, areca nut, and the other ingredients associated with betel chewing; however consumption levels of clove cigarettes, commercial wine, beer, and locally-produced palm wine are not constant. These purchases were listed under the category, recreation

Income

Table 22 lists the sources and amounts of demplot households' income in 1984-5. These data then are summarized in Table 23 which breaks down each category of income as a percentage of total income for each household.

Table 22

Demplot Household Income - 1984-5

Values are stated in million rupiah

HH#	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
Agr.																								
Rice	.86 ^{**}	1.7 ^{**}		.07	.11					.082			.352 ^{***}											
Banana	.1	.04		.04	.07	.015				.04	.03	.03	.075		.035	.2				.05	.04	.018		
Ban. stalk									.1															
Betel					.03																.4			
Coconut	.8				.072	.03			.01	.03		.005	.01			.01	.03				.025	.013		
Vegetab			.37		.075	.05						.15	.026			.03					.04		.075	
Sub-total	1.76	1.74	.37	.11	.357	.095		.1	.11	.02	.12	.185	.463		.003	.05	.04	.07	.035	.04	.09	.465	.106	.175
										.172	.15				.038	.29	.07	.07	.035	.09	.465	.106	.175	
Lvstock sale																								
Cattle	1.7	.62			.125	.375	.2	1.4	.525						.3	5.0		.2		.25				
Chick/egg		.04	.01	.01		.037			.025		.03		.030	.036	.02	.01							.015	
Goat													.010		.018									
Pig		.15											.015		.010	1.2			.08		.11			
Buffalo											.14													
Sub-total	1.7	.81	.01	.01	.125	.412	.2	1.4	.545		.17		.055	.036	.348	6.21		.2	.08	.25	.11	.015		
Tractor rental	.5																							
Family assistance			.4	.17	.13					.2	.15	.15	.050	.055	.075		.075		.1		.2	.04	.15	
Other																								
Rice mill	1.0																							
Wage labor																							.35	
Honorarium (vil. govt)			.06																					
Pension																								
Sal. (teach)							1.44												.13					
Sold jewelry			.075																					
" cakes				.3																			.06	
" crochet																								
" woven mats																	.012		.12					
Savings								.7 ^{**}									.04							
Sub-total	1.0		.135	.3			1.44	.7									.052	.31					.35	
Total	4.96	2.55	.915	.59	.612	.507	1.64	2.2	.655	.372	.47	.335	.568	.091	.461	6.500	.197	.580	.210	.340	.785	.511	.325	
-Expendits	4.952	1.605	.882	.573	.612	.499	1.296	2.164	.625	.473	.464	.35	.553	.043	.488	6.095	.193	.469	.215	.315	.720	.666	.285	
Net	1.223	.18	.033	.017	.0	.008	.344	.042	.03	-.121	.006	.025	.015	.048	.005	.405	.003	.116	-.005	.025	-.035	.005	.077	

*Includes sale of rice given in exchange for use of rice mill.

**From the sale of a tractor for Rp8,000,000 the previous year.

***Includes sale of rice earned as local representative of a water management group in Oesao.

Table 23

CATEGORY OF INCOME AS PERCENTAGE OF TOTAL INCOME

HH#	# in HH	Total Income in Million Rupiah	Agriculture	Livestock Sale	Tractor Rental	Family Assistance	Other
1	7	4.960	35.5	34.3	10.1		20.1
2	9	2.550	68.2	31.8			
3	7	.915	40.4	1.1		43.7	14.8
4	5	.590	18.7	1.7		28.8	50.8
5	3	.612	58.2	20.4		21.4	
6	3	.507	18.7	81.3			
7	9	1.640		12.2			87.8
8	10	2.200	4.6	63.6			31.8
9	4	.655	16.8	83.2			
10	4	.372	46.2			53.8	
11	5	.470	31.9	36.2		31.9	
12	5	.335	55.2			44.8	
13	4	.568	81.5	9.7		8.8	
14	2	.091		39.6		60.4	
15	10	.461	8.2	75.5		16.3	
16	5	6.500	4.5	95.5			
17	8	.197	35.5			38.1	26.4
18	6	.580	12.1	34.5			53.4
19	9	.210	16.3	37.2		46.5	
20	5	.340	26.5	73.5			
21	6	.785	60.0	14.2		25.8	
22	8	.511	20.8	2.9		7.8	68.5
23	5	.325	53.9			46.1	

Agriculture

91% of the demplot households derive measurable cash income from agricultural production. In general, this involves sales of rice, vegetables, coconuts and bananas to meet everyday needs. 38% of the households in the demplot derive under 25% of their income from agricultural sales; 26% obtain 26-50% of their income from agriculture; and for another 26%, agriculture accounts for 51-100% of their annual income. As has been explained elsewhere in this report, agricultural income is conditioned, in part, by household consumption needs. In addition, some agricultural income is unreported because farmers often barter rather than sell their produce and do not know the market value of such transactions.

Livestock

83% of the demplot households reported that they sold livestock in 1984-5. Livestock sales accounted for less than 25% of the income of 30% of the demplot households. 26% of all households derived 26-50% of their income from livestock. An additional 26% reported that livestock sales accounted for 60-96% of their income. As has been discussed elsewhere in this report, sales of livestock are contingent upon large annual and irregular expenses and contingencies. Thus, as with agricultural production, the contribution of animal husbandry to household income depends as much on need as on the actual production capacity of each household.

Family assistance

The 1984-5 income of 14 demplot households (61%), was not sufficient to meet their consumption needs. 30% of the demplot households received 26-50% of their income from family members. Only 9% of all demplot households received over 50% of their income in assistance; and 4% of all households received under 25% of their income in this way. In most cases of assistance, additional income was provided by adult children or siblings in the form of informal gifts or long-term informal loans to their elderly parents. In general, the necessity for money in these cases is not based on poverty or poor financial management. Rather, it is due to the fact that the the recipient households have given some or all of their livestock, use of productive land, and access to productive trees to younger siblings and/or their children. There are no formal use agreements. Rather there is a general assumption that children (or, to a lesser extent, younger siblings) will share the products and proceeds of harvests and livestock sales in accordance with their parents' or siblings' needs. In each case, the respondents explained that such gifts were irregular. The amounts of money provided usually were contingent upon the recipient household's specific needs. Two households in which the heads are young men (36 and 37 years respectively) also received assistance in this way. They share land and other resources with their parents and siblings. They have a loosely conceived reciprocal arrangement whereby they

continually help one another as necessary (by providing labor, sharing profits from livestock sales, providing food, and so on); and assume that over the long term their mutual assistance balances out.

Off-farm

30% of the demplot households claim between about 15 and 88% of their income is derived from off-farm activities and sources. The most striking example is household #7, headed by a local school teacher for whom nearly 88% of his family's income comes from his salary. None of the demplot farmers are sharecroppers and only one demplot owner (#23) engaged in wage labor in 1984-5 (and this only on an occasional basis during one or two months of the year). Nonetheless, this work contributed 68.5% of his family's total income.

In the off-farm category women supply up to 30% of their households' income by selling cake that they bake at home (#4) and by selling their crochet work (#17 and 18). One woman (#18) receives a widow's pension of which she contributes 50% to the household of her widowed father with whom she now lives.

Cattle trading is a major source of income for some young village men. Although no demplot owner earns money in this way, at least one owner's son who serves as a middleman in cattle sales. He is able to contribute to his family's household up to Rp.100,000 per month during two or three months of the year when he is actively engaged in this work.

Priorities for future expenditures

The farmers were asked to consider ways in which their own households and the village as a whole could benefit from additional income. Table 24 indicates the percentage of people who indicated each of the items listed as their top personal priority; while Table 25 lists the top priorities for village development. Having the farmers discuss priorities in this way was an artificial exercise in the sense that most villagers do not have a schedule of needs or wants for which they attempt to accumulate funds. With respect to village improvements, 100% of the respondents first answered that the consultant should direct that question to the village head to learn about his plans for village development. When it was explained that it was their personal opinion that was requested, most of them were able to list at least three improvements or changes that they deem necessary or desirable.

Table 24

Priorities for Household Improvements and Expenditures

	<u>%</u>
Improve existing house/build permanent house	34.0
Finance children's education (beyond elementary)	13.0
Purchase livestock (cattle, goats, horses)	6.0
Purchase a television	6.0
Improve diet	5.5
Save money for children's weddings (including bridewealth obligations)	5.5
Build permanent household well and/or water storage tank	5.0
Purchase clothing	4.0
Save money for tractor rental	3.0
Purchase land	3.0
Purchase vehicle (i.e., jeep)	3.0
Purchase pump for irrigating dry fields (ladang)	2.0
Purchase motorcycle	2.0
Install electricity	2.0
Purchase additional furniture and household goods	2.0
Save money for emergencies	2.0
Build house in Kupang	2.0
	<u>100.0</u>

Table 25

Priorities for Village Development

	<u>%</u>
Establish (or expand) irrigation system	24.0
Health or childbirth clinic	18.0
Reinstate agricultural cooperative (KUD)	16.0
Junior high and high school	15.0
General well-being (respondents refused to list specific improvements or activities because, they said, it is up to the government to determine specific priorities)	8.0
Asphalt road through entire village	6.0
Improvements to the church	5.0
Communal tractor	2.0
Aid for home improvements	2.0
Village market	2.0
Village meeting hall	1.0
Contingency fund	1.0
	<u>100.0</u>

The first priority listed in Table 25, to expand the irrigation system, may have been conditioned by the nature of the project with which the consultant was attached. This does not imply that development of water resources for agriculture is not an important desire or expectation on the part of the villagers, however. Rather, it indicates their interest in having irrigation systems established elsewhere in Pukdale and Oesao where they own land.

IV. Conclusion

The primary purpose of this report has been to provide baseline data regarding the 23 households that own land in the Pukdale groundwater demplot. This information will be used as a standard against which to compare data from a re-survey of the households. This re-survey will be conducted at the end of the first year of the demplot's existence after the farmers have had the benefit of dry season irrigation for secondary crops for the first time.

Comments on conducting the survey

There was little difficulty in collecting the base-line data once the interviews with farmers began. In general, both the male and female head of household were present and each responded to the questions with which he or she had more familiarity. Women, for example, provided most of the data on vegetable and tree crop production and marketing, household budgets, and small expenditures; while men provided information about livestock ownership, management and rice production.

Questions were asked in a variety of ways in order to elicit complete information on complex issues such as household income and expenditures and the variety of labor and sharecropping arrangements associated with rice production. Villagers generally do not calculate costs of household consumption, since most of their purchases and exchanges in the market are directly related to the amount of produce they bring in to sell. The amount and variety of their purchases (or exchanges) and the amount of bananas, vegetables, and so on that serve as market currency are conditioned by both the perceived amount of goods needed and the availability of agricultural produce to sell.

The most detailed questioning involved rice production levels and the arrangement made between the village landowners and the outside laborers they hire seasonally. Payments are made in paddy, in unhusked rice, or in cash depending upon the tasks and, in some cases, upon the preference of the laborers. Thus, respondents might explain that they pay harvesters five kilos per day (meaning paddy) and state that weeders receive 15 blek (bisquit tins of 10 to 12 kilos unhusked rice) per half hectare. At each stage of the discussion, the consultant had to clarify what measures the farmers were using. In addition, some compensation arrangements involved providing food (uncooked milled rice or corn) to the laborers; these costs had to be deducted from harvest data or household consumption information as appropriate.

Production information could not be taken at face value either. When asked about their rice yields, respondents usually provided the amount of their share of unhusked rice after laborers, rencah cattle owners, sharecroppers, and so on had been paid.

The only issue with which the consultant experienced difficulty stemming from respondents' reluctance to supply information was the question of cattle ownership. People under-report their cattle holdings as a matter of course, based on the concern that they will be assessed a head tax on large herds. Based on the village census reports and informal information from conversations with villagers, we had a reasonably accurate estimate of the numbers of cattle owned by the large holders in the demplot group. With this knowledge, it was possible to question respondents' statements that their herds were "small" and eventually to elicit a realistic figure. Absolute numbers of cattle and age and sex distribution within large herds were not possible to ascertain since owners themselves have only rough estimates of this information based on a yearly round-up of their cattle at the end of the dry season.

In conducting the survey, the consultant had considerable difficulty finding demplot household members at home to be interviewed. The survey was undertaken during the middle and end of the dry season at which time over 75% of the male heads of household and their older sons were tending gardens and livestock in other parts of the village. Women, too, were not always in their homes. On market days, as many as 50% of the female heads of household were in Oesao to shop and sell their produce until mid-day; and other days of the week they often worked in gardens located 100 meters or more from their homes. The best times to interview were late in the day, particularly on Saturday, and on Sunday when nearly everyone was at home after attending the local church in the morning. Families were amenable to making appointments for the interviews, providing they could be conducted at the farmers' convenience.

Relevance of the data

In addition to providing baseline data on the demplot households themselves, this report also compares data regarding demplot households with the same information about households in the village at large. This was taken from 1984-5 village household census records which are based on an annual house-to-house survey conducted by the head of each hamlet within the village on behalf of the village secretary. Wherever available, the consultant's survey data and village census information were compared with records about the village that are available at the kecamatan administrative headquarters.

The purpose of these comparisons was two-fold. First, they were intended to place the demplot households in the context of the community at large in order to determine their socio-economic status relative to others in the area. Secondly, the survey data was used to check the reliability of the village and kecamatan information.

With respect to socio-economic status - regardless of whether survey and village census data or census data alone were compared - the demplot households are more secure and affluent

than those in the community at large with respect to the principal measures of wealth and access to resources. These indicators include: ownership of productive rice and garden land, ownership of productive trees (coconuts and bananas), ownership of livestock (principally cattle), and ownership of tractors. Category of dwelling, on the other hand, was not a reliable marker given the differences in the value of homes within each type, and especially within the most common category, "semi-permanent" (having partial masonry walls).

Data from the village census was not entirely reliable for two important reasons: 1) households under-report their holdings, particularly of cattle; and 2) land owned outside of the village does not enter the census either in the village of the owner's residence or in the village in which the land is located. With respect to cattle, households under-report the size of their herds in part because they fear they will incur a sizable head tax and in part because they do not know the exact number of their cattle that roam freely for most of the year. In addition, some cattle that pasture in Pukdale are owned by outsiders about whom there are no village records. A large cattle exporting company in Kupang owns at least 8 hectares of (fenced) land in Pukdale where they keep several thousand head of cattle. With respect to demplot farmers' land ownership, the majority of households own more sawah outside of the village than within it and this is not recorded in records of either the village of ownership or of residence. On the other hand, demographic information from the village census corresponded in all cases with that obtained in the survey.

Kecamatan level records were not reliable. Information about village land area and distribution of land use within the village was based on reports made prior to an expansion of the village which took place about five years ago. Furthermore, numbers of livestock, amount of rice production, and other key data on village resources bore no relationship with village census information. Kabupaten level records are not village-specific, so they are not useful in making village-to-village comparisons. Village-specific information from other local potential sources of demographic and agricultural data - the local health clinic and the agricultural extension center, respectively - was not available.

Clearly, the raw village census records are the most useful existing source of socio-economic information, if one has the time to tabulate them. Theoretically the village secretary and/or village head should keep up-to-date village-wide totals of property holdings; however these were not readily available in Pukdale.

Using Pukdale as a model

Taken as a whole, the demplot households do not constitute a representative sample of the village population. They are, on the average, more affluent, slightly larger, and comprised of older members than households in the village at large. Further-

more, there is a concentration of prominent village residents there. The demplot is located in one of the oldest and most densely settled parts of the village and is bisected by a main village road that leads directly to the Kupang-Atambua (trans-island) road.

On the other hand, the explanations of the role of livestock in villagers' lives, organization of agricultural production, division of labor, attitudes about money and other resources, and other issues discussed in this report are directly applicable to a wider population. All of the farmers in the areas of Oesao and Pariti which have been designated for inclusion in SSIMP groundwater activities are Rotinese, and they have the same basic socio-cultural background as the demplot villagers. Certainly there are numerous intra-regional variables that may affect project planning and future success (e.g., ecological conditions, access to roads and markets, villagers' previous exposure and access to rural development programs, and so on). Nonetheless, these factors must be considered in context of the basic social, economic, and cultural practices and attitudes that shape the lives and activities of the population of the project area.

Annex A

**Comparative Monthly Rainfall Data
from 3 Sites in Kabupaten Kupang**

Days and MM. of Rain at Babao (B), Naibonat (N), & Penfui (P)

		1980		1981		1982		1983		1984		1985	
		#	mm	#	mm								
Jan-	B	14	430	16	476	11	340	13	238	17	325	8	241
	N	14	617	21	580	11	323	13	492	17	363	22	332
	P	21	609	25	567	17	446	15	447	25	602	12	194
Feb-	B	14	483	22	345	14	369	13	156	18	515	14	314
	N	15	615	22	389	15	243	14	409	17	1049	16	801
	P	16	589	24	436	19	418	20	419	24	480	16	187
Mar-	B	10	109	9	141	10	157	10	209	15	462	6	101
	N	6	51	9	21	11	183	8	348	14	1096	6	452
	P	7	62	11	141	15	334	11	237	13	258	11	124
Apr-	B	6	39	1	20	4	41	14	320	1	9	8	72
	N	3	180	3	21	3	52	15	706	2	25	7	132
	P	4	93	3	15	3	40	16	196	4	20	6	54
May-	B	1	3	4	23	1	4	2	8	4	15	1	3
	N	-	--	1	4	1	4	1	14	3	52	-	--
	P	2	18	3	44	1	7	3	50	1	12	-	--
Jun-	B	2	3	5	37	2	4	-	--	2	5	3	5
	N	-	--	4	20	1	2	-	--	1	4	-	--
	P	3	6	5	29	1	4	-	--	1	1	3	6
Jul-	B	1	3	3	11	1	4	-	--	-	--	-	--
	N	-	--	2	36	1	1	-	--	1	2	-	--
	P	-	--	3	11	2	14	-	--	1	3	1	14
Aug-	B	-	--	1	4	1	2	-	--	-	--	-	--
	N	-	--	-	--	1	1	-	--	-	--	-	--
	P	-	--	-	--	-	--	-	--	-	--	-	--
Sep-	B	-	--	3	7	-	--	-	--	2	52	2	21
	N	1	7	-	--	-	--	-	--	2	11	2	35
	P	-	--	4	43	-	--	-	--	3	29	-	--
Oct-	B	4	35	-	--	-	--	3	26	2	5	4	53
	N	4	37	-	--	-	--	3	26	1	10	2	120
	P	2	19	1	4	-	--	4	58	1	34	2	13
Nov-	B	9	79	14	329	2	59	12	163	7	43	6	154
	N	10	103	17	359	6	43	15	398	5	128	2	59
	P	8	86	19	273	2	77	11	108	6	50	11	131
Dec-	B	13	346	10	335	8	191	8	73	20	316	11	170
	N	14	371	13	766	9	491	9	117	22	967	6	108
	P	14	357	16	675	10	161	8	113	24	415	13	169

Average Monthly Rainfall at Babao, Naibonat, & Penfui Stations

1980 - 1985

	<u>Babao</u>		<u>Naibonat</u>		<u>Penfui</u>	
	# days	mm	# days	mm	# days	mm
January	13.2	341.7	16.3	451.2	19.2	477.5
February	15.8	363.7	16.5	584.3	19.8	421.5
March	10.0	196.5	9.0	358.5	11.3	193.3
April	5.7	83.5	5.5	186.0	6.0	69.7
May	2.2	9.3	1.0	12.3	1.7	21.8
June	14.0	9.0	1.0	4.3	2.2	7.7
July	.8	3.0	.7	6.5	1.2	7.0
August	.3	1.0	.2	.2	-	-
September	1.2	13.3	.8	8.8	1.7	12.0
October	2.2	19.8	1.7	32.2	1.7	21.3
November	8.3	137.8	9.2	181.7	9.5	120.8
December	11.7	238.5	12.2	470.0	14.2	315.08

Annex B

Pukdale Village Demographic Survey

Summary of Pukdale Village Demographic Survey*

Total female headed households: 27
 " male " " : 321
 " number of households : 348

Occupation (as listed in census):

	head of household	member of household**
Farmer	306	128
School teacher	6	2***
Driver (truck, minibus)	4	
Civil servant	2	
Business/trade	1	
Fishing	1	
Minister (Protestant)	1	
Evangelist/preacher		1
Employee of private co.	_____	_____1
Total	321	132

* Taken from the 1984/5 village household census. Data is collected annually on a house-to-house basis by the heads of each of the five hamlets (dusun) within the village. This information is provided to the village head and secretary for their use in filling out kecamatan and kabupaten level forms, other questionnaires, and so on. The census lists for each household the name, age, occupation, and level of education attained to date by each member.

** For some households, male members over 16 years of age are listed as farmers. This is misleading since it is not consistent for all households and because it does not include women who also work as farmers.

*** These two individuals are women. They are the only women in the census for whom an occupation is listed.

Population by age and sex*

<u>age</u>	<u>male</u>	<u>female</u>	<u>total</u>	<u>%</u>
0-4	148	131	279	16.7%
5-12	180	180	360	21.5%
13-18	117	93	210	12.6%
19-49	314	297	611	36.5%
50-65	80	71	151	9.0%
66-80	35	22	57	3.4%
81+	1	4	5	.3%
Total	875	798	1673	100.0%

Male population by level of education*

educ.** level	age							Sub- to- tal	% of tot. male pop.
	0-4	5-12	13-18	19-49	50-65	66-80	81+		
illit.	-	-	5	23	19	15	1	63	7.2
not yet enter- ed	146	53	1	-	-	-	-	200	22.9
kinder- garten	2	3	-	-	-	-	-	5	.6
elem.	-	124	69	239	58	19	-	509	58.2
jr. high	-	-	39	27	1	1	-	68	7.7
high	-	-	3	21	2	-	-	26	2.9
higher educ.	-	-	-	4	-	-	-	4	.5
Total	148	180	117	314	80	35	1	875	100%

* Data was taken from the village household census.

** The educational levels listed in this column correspond to the Indonesian categories: illiterate - buta huruf (BH); not yet entered school - belum sekolah (BS); kindergarten - taman kanak-kanak (TKK); elementary - sekolah dasar (SD); junior high - sekolah menengah pertama (SMP); high - sekolah menengah atas (SMA); and higher education - perguruan tinggi (PT).

Female population by level of education

educ. level	age							Sub- to- tal	% of tot. fem. pop.
	0-4	5-12	13-18	19-49	50-65	66-80	81+		
illit.	-	-	3	37	31	17	4	92	11.5
not yet enter- ed	131	47	2	2	-	-	-	182	22.8
kinder garten	-	2	-	-	-	-	-	2	.3
elem.	-	128	58	213	40	6	-	445	55.8
jr. high	-	2	31	31	-	-	-	64	8.0
high	-	-	-	13	-	-	-	13	1.6
higher educ.	-	-	-	-	-	-	-	-	-
Total	131	179	94	296	71	23	4	798	100%

Total population population by level of education

educ. level	age							Sub- to- tal	% of to- tal pop.
	0-4	5-12	13-18	19-49	50-65	66-80	81+		
illit.	-	-	8	60	50	32	5	155	9.2
below school age	277	100	3	2	-	-	-	382	22.8
Kinder garten	2	5	-	-	-	-	-	7	.4
elem.	-	252	127	452	98	25	-	954	57.0
jr. high	-	2	70	58	1	1	-	132	7.8
high	-	-	3	34	2	-	-	39	2.3
higher educ.	-	-	-	4	-	-	-	4	.5
Total	279	359	211	610	151	58	5	1673	100%

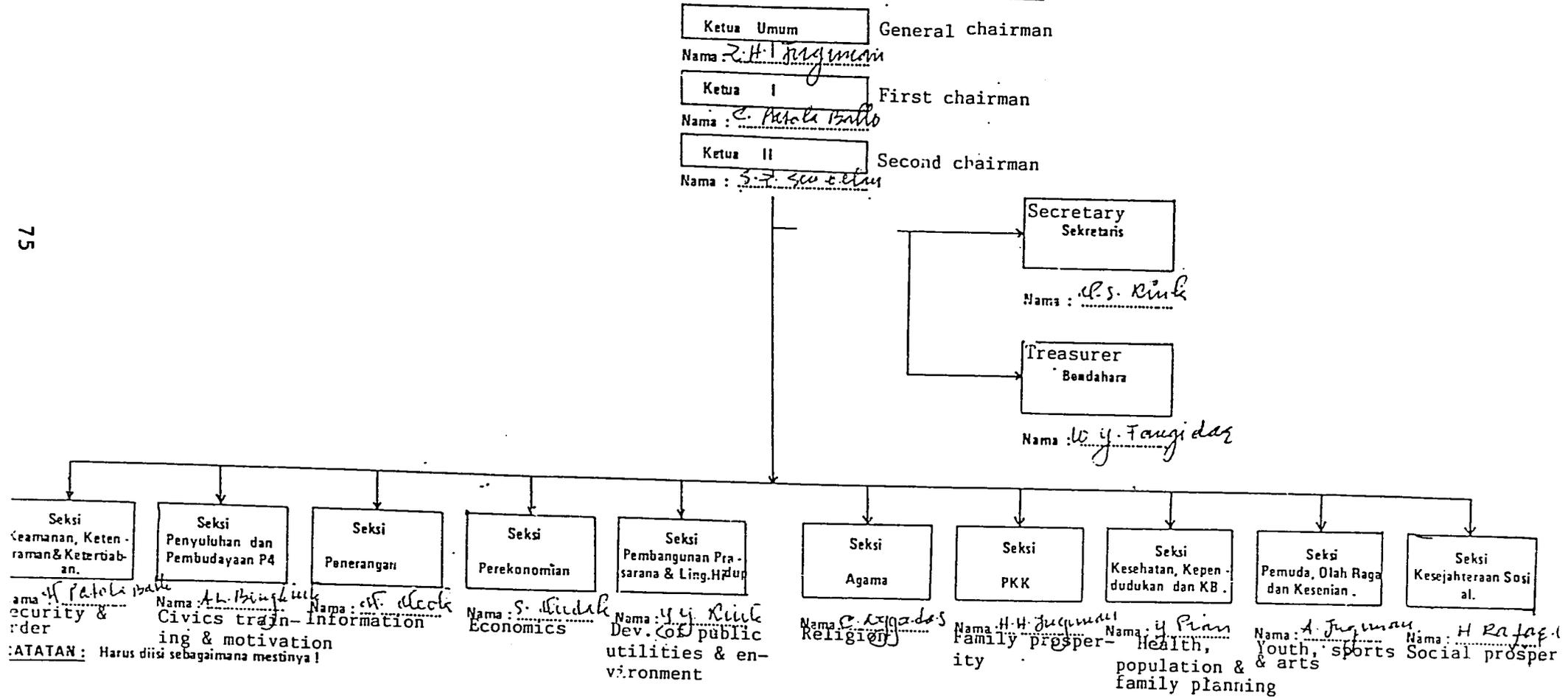
Annex C

Village Administrative Structure

Organizational Structure of the Village Resiliency Council

SUSUNAN ORGANISASI
LEMBAGA KETAHANAN MASYARAKAT DESA (LKMD) -
DESA/KELURAHAN : Pukdale

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Annex D

Pukdale Monthly Land Registry Forms

Sample Monthly Village Land Registry Form

MODEL IV

No	Jenis beruntukan/penggunaan	Luas Tanah				Jumlah M ²	Letak Dusun RW,RT	Status Tanah		Keterangan	
		Tanah Desa/Ke- lurahan M ²	Tanah milik Perorangan M ²	Tanah milik Badan Hukum M ²	Tanah milik Negara M ²			Hak	Sertifikat		
									10		11
1	2	3	4	5	6	7	8	9	10	11	12
1	Tanah Perkampungan										
2	Tanah Pertanian										
3	Tanah Perkebunan										
4	Kebun Campuran										
5	Hutan										
6	Kolam Ikan										
7	Danau/Rawa										
8	Tanah Tandus/ Rusak										
9	Alang-alang/ Padang rumput										
10	Tanah Sengketa										
11	Tanah Bangunan										
12	Tanah Penggunaan lain-lain										

Monthly Village Land Registry*

Model: IV

Month: July, 1984

Land Use	Land Ownership (in square meters)				Total
	Village	Private	Corporate	State	
	3	4	5	6	
1 Settlements		2,120,450			2,120,450
2 Agriculture		2,003,300	20,000		2,023,300
4 Mixed gardens		655,300			655,300
9 Grasslands				44,135,150	44,135,150
11 Bldg sites ¹	1,000,000				1,000,000
12 Other uses ²	12,500		45,000	20,000	77,500

Total village land area (in m²): 50,011,700

(= 5,001 ha.)

*

This is an abridged translation of the Monthly Village Land Registry. It shows only those categories that apply in the case of Pukdale, hence the incomplete numbering.

¹ This is designated as residential land.

² This is designated as land occupied by the village office and meeting hall and the village church and its adjacent yard.

Annex E

Pukdale Household Property Census

Livestock Holdings

Distribution of Livestock Ownership by Type

The following chart shows the combinations of types of livestock owned and the number of owners of each combination according to data from the village property census:

Total number of livestock owners: 291 households

<u>Types of livestock owned</u>	<u># households</u>
1. pigs + chickens	74
2. cattle + pigs + chickens	52
3. cattle + pigs + chickens + horses	27
4. pigs	22
5. chickens	19
6. cattle + pigs	14
7. cattle + pigs + chickens + horses + goats	10
8. cattle + pigs + chickens + goats	10
9. pigs + chickens + goats	9
10. cattle + chickens	8
11. cattle	7
12. cattle + pigs + horses	4
13. cattle + chickens + horses	4
14. cattle + pigs + goats	3
15. pigs + goats	3
16. chickens + horses	3
17. goats	3
18. cattle + pigs + horses + goats	2
19. cattle + horses	2
20. cattle + chickens + goats	2
21. pigs + chickens + horses	2
22. chickens + goats	2
23. cattle + pigs + chickens + horses + goats + water buffalo	1
24. cattle + pigs + goats + water buffalo	1
25. cattle + pigs + horses + water buffalo	1
26. cattle + chickens + horses + goats	1
27. cattle + horses + goats	1
28. cattle + goats	1
29. pigs + horses + goats	1
30. horses + pigs	1
31. horses	1

Aggregate Cattle Ownership
as Registered in Household Property Census

# head of cattle	# of owner households	As % of total village households
1 -----	16 -----	4.6
2 -----	24 -----	6.9
3 -----	7 -----	2.0
4 -----	5 -----	1.4
<u>5 -----</u>	<u>21 -----</u>	<u>6.0</u>
Sub-total 207 head	73	20.9%
6 - 10 -----	28 -----	8.0
11 - 15 -----	8 -----	2.3
16 - 20 -----	9 -----	2.6
21 - 25 -----	6 -----	1.7
26 - 30 -----	5 -----	1.4
31 - 35 -----	1 -----	.3
36 - 40 -----	6 -----	1.7
50 -----	7 -----	2.0
60 -----	1 -----	.3
125 -----	1 -----	.3
150 -----	2 -----	.6
200 -----	2 -----	.6
<u>250 -----</u>	<u>1 -----</u>	<u>.3</u>
Total 2832 head	150	43 %