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SURVEY OF FARMERS' CURRENT USE OF MULTIPURPOSE TREE SPECIES ON SMALL UPLAND FARMS IN EASTERN VISAYAS PHILIPPINES

REPORT NUMBER 6

by
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The Authors

ABSTRACT

This study was conducted to determine the socio-demographic profile of small upland farmers and the current small-farm uses of multipurpose tree species (MPTS) in four selected critically- and partially-denuded sites in Leyte (Eastern Visayas), Philippines. Data were collected through a combination of observation and formal and informal interviews with 25 household heads in each site.

The respondents in all sites were on the average in their late forties while their spouses were a few years younger. The average educational attainment of respondents was three years. Those from critically-denuded sites had one year less education than those in the other areas. Households in the critically-denuded sites were smaller, with fewer children. Almost all owned their houses but few owned their house lots. Their total farms averaged over two hectares; more from the critically-denuded sites mortgaged their farms while most from the other sites were share tenants. Both practiced soil-nutrient depleting cropping patterns, but more respondents from the critically-denuded sites than from the other sites reported infertile soil and low yield as major farm problems. Some attributed these as effects of soil erosion. Most households in the critically-denuded sites grew cereals for food and earned cash income from raising animals. Those from the other sites purchased food with their income from coconut (Cocus rucifera) and abaca (Musa textilis) and from off-farm labor.

Ipil-ipil (Leucaena leucocephala) and, to a very limited extent, madre de cacao (Gliricidia sepium) are currently grown by farmers with some degree of regularity. However, these species were often not planted in some productive arrangement with food crops as in most agroforestry schemes. Alley cropping and improved fallow systems are still foreign to many upland farmers in the region.

Fruit and non-fruit tree species were used by farmers in a number of ways, from sources of wood for fuel, posts, construction materials, furniture, handicrafts, household tools/utensils, and farm implements to sources of food, fodder for livestock, and to a very limited extent green manure for soil improvement. Farmers from the critically-denuded sites relied heavily on very few locally available tree species, mostly ipil-ipil, madre de cacao, and acacia (Albizia saman, formerly Samanea saman), while those from the partially-denuded sites utilized a wider range of tree species, many of which were collected from the forest. It was observed that when people have access to forest resources and alternate sources of fuel (e.g., coconut materials), their motivation to grow trees is generally low, especially under subsistence-farming conditions. Even with the growing awareness of the problem of fuelwood/fodder scarcity in the region, tree growing seems to play only a secondary priority to the more fundamental concern of food production.

CHAPTER I
INTRODUCTION

The importance of woody perennials (trees, shrubs and lianas) in today's farming systems is becoming increasingly recognized as a result of the rapid depletion of forest resources and the increasing demand for fuelwood and other essential tree products. Indeed, the need to supply man's needs for food, shelter, fuel, and fodder from small units of land calls for the exploration of multipurpose species of trees and other plants for their potential role in meeting these needs (Burley, 1985). It is not surprising, therefore, that research and development efforts in forestry today are now focused on the production and use of trees in multipurpose land-use systems. Trees do not only improve the productivity and sustainability of tropical land-use systems but also provide the wood needs of small farmers (Burley & Von Carlowitz, 1984). Scientists in India, Thailand, Nepal, Sri Lanka, Indonesia, the Philippines and other Asian countries are now involved in research and development programs on multipurpose tree species (MPTS), especially fast-growing hardwood species (NAS, 1984).

The term "multipurpose trees" has been defined to include trees which are "deliberately grown or kept and managed for preferably one intended use, usually economically and/or ecologically motivated products and/or services in any multipurpose land-use system, especially agroforestry systems" (Burley & Von Carlowitz, 1984). The concept of MPTS has been further elaborated to include shrubs, palms, vines, and bamboos which have applications in social/community forestry, agroforestry, and other land-management systems (Burley, 1985). In general, however, multipurpose trees are more closely associated with trees and shrubs that meet the many household needs of small farmers.

At present, very little is known of the small-farm uses of multipurpose tree/shrub species. Information on how MPTS are currently used on small farms and how they could possibly be used by other small-hold farmers is vital in planning future MPTS research and development programs.

This research was therefore undertaken to (1) construct a profile of small farmers in selected rural upland communities in Eastern Visayas, the Philippines and (2) determine current small-farm uses of multipurpose tree species in these areas.

Objectives

Study 1: Profile of Small Farmers in Selected Rural Upland Communities in Eastern Visayas, the Philippines.

(1) To determine the socio-economic and demographic characteristics of small-hold upland farmers;

(2) To identify farmers' needs and problems related to upland farming and current land-use systems;

(3) To determine the attitudes of farmers toward tree-growing and other forestry-related activities; and

(4) To ascertain farmers' perception of wood/fodder scarcity and identify measures farmers had undertaken to improve their availability.

Study 2: Survey of Current Small-Farm Uses of Multipurpose Tree Species in Eastern Visayas, the Philippines.

(1) To determine the current and potential uses of multipurpose tree/shrub species on small upland farms;

(2) To determine the tree species and characteristics desired by farmers for fuelwood, round post/poles, fodder, and other uses: and

(3) To analyze current wood/fodder supply and consumption patterns among rural households.

Review of Literature

Socio-demographic profile of upland farmers in Eastern Visayas. Upland farmers in Eastern Visayas are poor (FSDP-EV, 1986). They are among the most neglected sector of the society: the least educated, least healthy, with the lowest income and the least access to support services, (Alcantara, 1985).

An average upland household usually has five to six members who depend on incomes below the poverty level (Sajise, 1983). Farm holdings rarely exceed three hectares and household incomes rarely surpass P3,000 per year. The majority of upland farmers in Eastern Visayas farm mainly for subsistence, producing crops almost entirely for household consumption. About 40 to 70 percent of their cash incomes come from off-farm wage employment (Alvarez, 1983). Most upland farms in the region are on hillsides or sloping terrains. The majority are share tenants or

share croppers; few are owner-cultivators and amortizing owners. Various combinations of crops, mostly including corn, rice and rootcrops, are planted all year round.

Most household heads are in the middle-age bracket with an average schooling of about four years. Their wives are usually younger and have comparable education. Children constitute a significant portion of the household labor force for farm work, and many can not finish even grade school because of the economic plight of their parents.

Farming systems of upland farmers in Eastern Visayas. Most upland farmers in Eastern Visayas operate in unproductive, marginal, and risky environments and practice complex farming systems (Lightfoot et al., 1986). The farms are usually located on rolling or steep slopes where soil erosion depletes most of the soil nutrients essential for plant growth. Soils are predominantly Ultisols which are acidic, low in organic matter and low in nutrients like phosphorous and nitrogen. Their farming systems can be categorized into two major types, (1) the fallow-rotation system and (2) permanent systems.

The fallow-rotation system (fallow - crop rotation - fallow) is designed to restore soil fertility after two to five years of continuous cropping. Farmers generally plant corn in newly opened fallows, then shift to rice as soil fertility declines because rice thrives better than corn in less fertile soils. As soil fertility declines to critical levels, farmers shift to root crops after which the land is left to fallow. Fallow periods vary from field to field, usually five to ten years (Ly, 1988). Some farmers plant trees, often ipil-ipil (Leucaena leucocephala), to help fertilize the land naturally and at the same time meet their needs for fuelwood, fodder, and construction materials.

Shifting cultivation is a special form of fallow-rotation system. It differs from the normal system in that the is not under formal tenure and farmers (called "kaingineros") are not certain of recultivating the lands after left in fallow.

Permanent systems are characterized by continuous cropping, whether on sloping or flat lands. Crops include rice, corn, grain legumes, root crops, banana, and abaca. Trees are planted to a minor extent. As with the fallow-rotation system, soil fertility is critical. A sound farming strategy for sustaining soil fertility, especially in sloping lands, is through alley cropping in which trees, preferably nitrogen-fixing multipurpose trees, are planted as contour hedgerows in between alleys of food crops, or by making organic additions (mulching, intercropping, manuring, etc). At present, however, these soil management practices remain foreign to many upland farmers in the region.

The Study Sites

The study was conducted in four (4) selected upland sites in Leyte (Eastern Visayas), Philippines. Two of the sites were already critically denuded while the other two were only partially-denuded. The social and bio-physical features of each site are described below.

San Jose. San Jose, the first of the two critically-denuded sites, is 10 kilometers away from the town of San Isidro, Leyte (Figure 1). The village is dominantly hilly with very few upland plains. Its hillsides are practically devoid of natural forest cover except for some few patches of shrubs and bushes and scattered trees, mostly acacia (Albizia saman, previously Samanea saman). Soil type is generally of the Faraon clay type, coarse, blocky to granular in structure, plastic when wet, and very vulnerable to erosion when dry. Soil fertility levels in the area are generally low.

Corn, the dominant crop, is usually planted with mungbean, rootcrops, coconut, banana, fruit trees, and ipil-ipil. Fallowed areas are generally grass-dominated but some are planted to ipil-ipil to help shorten the fallow period and at the same time provide wood needs of the farmers.

Transportation and water supply are acute problems. The barangay is hardly accessible by vehicle, especially during the rainy season. A few open-dug wells serve the water needs of the residents, and water from these wells is generally unsanitary.

Market outlets for farm products are distant. Public facilities are practically non-existent except for an elementary school with two or three teachers. Residential houses, mostly made of bamboo, roundwood, nipa and cogon, are typical of resource-poor rural farmers.

Barangbang. Barangbang, the second critically-denuded site, is two kilometers from Cagnocot, Villaba, Leyte (Figure 1). Both critically-denuded sites are located in northwest Leyte.

The area is hilly with sparse vegetative cover. Soil type is dominantly of the Lugo clay type. Crops include corn, vegetables, legumes, rootcrops, and some perennials like coconut, coffee, cacao, fruit trees, and leguminous trees. Overall, the environment closely resembles that of San Jose.

Barangbang is not accessible by public transport. Farmers have to transport their farm products manually from their farms to the market outlets. Cagnocot, the nearest town, is accessible by jeepneys and motorcycles although there are no regular vehicles serving the area. Water supply is a major problem in the locality. Even open-dug wells, which are not safe sources of drinking water, are limited.

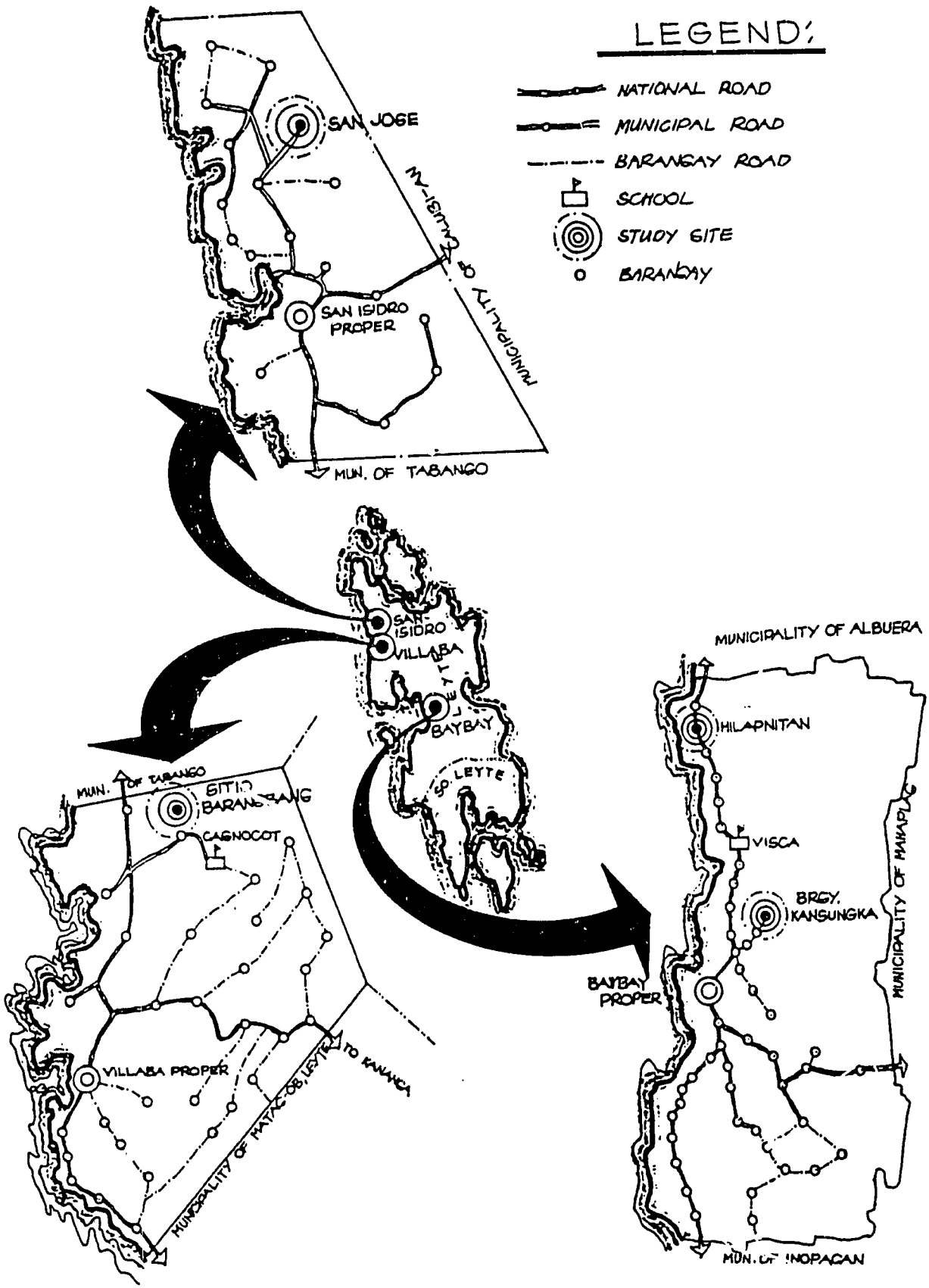


Figure 1. Map of Leyte, Philippines showing the sample sites.

Health and other support services are also not readily available. Public facilities include a chapel, an elementary school, a high school and an agricultural college, all situated two kilometers away in Cagnocot.

Hilapnitan. Hilapnitan, the first of the two partially-denuded sites, is located at the northern part of Baybay municipality (Figure 1). Situated between the mountains to the east and the sea to the west, it is characterized by slightly rolling to sloping terrain, with access to a partially-denuded forest.

Hilapnitan has about 1,400 residents in 312 households engaged in either lowland or upland farming, or both. Most farmers are share croppers or landless agricultural workers. Rice, corn, root crops, legumes, vegetables, coconut, banana, and abaca are the dominant crops.

The area is accessible by public transport and has good access to several market outlets. The village is widely known for its firewood and charcoal products which are generally sold to nearby market outlets like the Visayas State College of Agriculture (ViSCA) and neighboring barangays. Firewood gathering is rampant, an activity which obviously puts added pressure to the fast disappearing forest-resource base.

Hilapnitan has a few social-service facilities which include chapels, an elementary school, basketball courts, and a barangay health center. Houses are mostly made of light materials (wood, nipa, and bamboo). Several water outlets serve the water needs of the residents.

Kansungka. Kansungka, the second partially-denuded site, is about 5 kilometers from the town of Baybay and is reached chiefly by motorcycle. It has a population of 723 residents in 136 households engaged in either lowland or upland farming. The barangay has access to a natural forest (Mt. Maganhan) to its east.

The residents, the majority of whom are landless agricultural workers or share croppers, can be classified into two main groups: (1) lowland farmers who are old settlers in the area and (2) upland farmers who practice "kaingin" or shifting cultivation. The latter group of farmers who reside in an upland sitio of the barangay have farms located four to ten kilometers up in the mountains. The main farm crops include rice, corn, root crops, coconut, vegetables, abaca, and some perennials like coffee, cacao, fruit trees, and ipil-ipil.

Transportation is a major problem, especially during the rainy season when rivers overflow and block the area from entry by vehicles. Market outlets are five to seven kilometers away, with no regular transport vehicles available. Public facilities are also poor and limited as in the other study sites.

CHAPTER II

THE UPLAND HOUSEHOLDS: A PROFILE

Socio-demographic Characteristics. The distribution of respondents by selected household characteristics is presented in Table 1 and Appendix Table A1. The mean age of the husbands in the critically-denuded areas (48.4; range = 25-70) was one year higher than that in partially-denuded sites (47.4). More of the older (56-70) and the younger husbands (25-35) were from the critically-denuded villages, while the majority (62%) of the husbands in the partially-denuded areas were between 36 to 55 years old (range = 21-81).

In contrast, the mean age of wives from critically-denuded sites (44.1) was slightly lower than that from partially-denuded areas (44.5). Almost a third of the wives from the critically-denuded sites were 24 to 35 years old. On the average, the wives from critically-denuded sites were about four years younger than their husbands; those from partially-denuded areas were three years younger.

Husbands from the critically-denuded villages had on average one year less educational (2.6) than those from the partially-denuded site (3.5). There were more than twice as many husbands without formal education in the critically-denuded (38%) than from the partially-denuded sites (16%). About an equal number of husbands in both sites attained elementary and secondary education.

Average educational attainment of wives from critically-denuded sites (2.7) was also a year lower than wives from the partially-denuded areas (3.7), and the percentage of wives from critically-denuded villages with no formal education (34%) was more than double that of their counterparts in the partially-denuded sites (16%).

Table 1. Summary of socio-demographic characteristics of households in critically-denuded and partially-denuded sites

Variables		Critically Denuded %	Partially Denuded %	Total %
Age of husband (years)				
	Mean :	48.4	47.4	47.8
	Mode :	55.0	37.0	38.0
	Range:	25-70	21-81	21-81
	S.D. :	14.1	12.8	13.2
Age of wives (years)				
	Mean :	44.1	44.5	44.3
	Mode :	55.0	45.0	45.0
	Range:	24-64	23-70	23-70
	S.D. :	12.4	11.1	11.6
Educational attainment of husband (years)				
	Mean :	2.6	3.5	3.1
	Mode :	0	2.0	0
	Range:	0-10	0-10	0-10
	S.D. :	2.6	2.6	2.6
Educational attainment of wife (years)				
	Mean :	2.7	3.7	3.2
	Mode :	0	6.0	0
	Range:	0-10	0-10	0-10
	S.D. :	2.5	2.7	2.6
Household Size				
	Mean :	5.0	5.7	5.4
	Mode :	4.0	5.0	4.0
	Range:	1-14	2-10	1-14
	S.D. :	2.4	2.0	2.2

Table 1. (Continued)

Variables	Critically Denuded %	Partially Denuded %	Total %
Number of Children			
Mean :	4.8	5.1	5.0
Mode :	3.0	4.0	3.0
Range:	1-12	0-11	0-12
S.D. :	2.1	2.8	2.5
Number of Dependents			
Mean :	3.1	3.8	3.4
Mode :	2.0	2.0	2.0
Range:	0-12	0-8	0-12
S.D. :	2.3	2.0	2.2
Age of Youngest Child			
Mean :	6.6	9.2	8.2
Mode :	11.0	7.0	1.0
Range:	0.2-18	0.2-26	0.2-26
S.D. :	5.3	7.8	7.1
Age of Oldest Child			
Mean :	15.5	22.5	19.8
Mode :	14.0	12.0	14.0
Range:	6-28	2-54	2-54
S.D. :	5.8	11.4	10.2

Households in the critically-denuded sites had slightly fewer members (mean = 5; range = 1-14) than those in the partially-denuded areas (mean = 5.7; range = 2-10), these in the critically-denuded sites having slightly fewer children (4.8) and fewer dependents (3.1) than those from partially-denuded areas (5.1 and 3.8, respectively).

House and lot ownership. Ninety-eight percent of the respondents in the critically-denuded sites and 94 percent in the partially-denuded areas own their

houses (Figure 2 and Appendix Table A2). In both sites most houses are made of light materials (nipa, cogon, bamboo, round wood, and some lumber). Very few use semi-permanent materials such as wood and galvanized iron for their houses. Those who do not own their houses live in relatives' houses for which they pay no rent. Hardly any households rent the houses where they live.

In contrast to house ownership, only 60 percent of the respondents in the critically-denuded sites own the lots on which their houses are built, and merely 14 percent, or 1 in 7 people in the partially-denuded sites own their house lots (Figure 3). Of those who do not own their house lots none from the critically-denuded villages and only 4 percent from the partially-denuded sites pay rent for the lots; the rest use the lots for free.

Tenurial status. In the critically-denuded sites, 54 percent of the households with farms on flat, low lands (Figure 4 and Appendix Table A3) and 62 percent of those with farms on sloping lands (Figure 5) had a mortgage on their farms. About 30 percent of both those with flat farms and those with hilly farms, were share tenants. Few were owner cultivators. In the partially-denuded sites, however, most respondents were share tenants (70.9% with flat farms; 48% with sloping farms). None were amortizing owners but some were owner cultivators. Others in the partially-denuded sites were either stewardship-contract holders or squatters.

Size of farms. Flat farms in critically-denuded sites (Figure 6 and Appendix Table A4) were small (mean = 0.6 ha.; range = 0-2.5 ha.). Seventy-four percent of these farms were less than one hectare, 18 percent between one to 1.9 hectare; and only 8 percent were two hectares or bigger.

Sloping farms in critically-denuded areas (Figure 7) were bigger (range = 0.1-6.3 ha.; mean = 1.6 ha.). Only 38 percent were smaller than one hectare, 34 percent were one to 1.9 hectares while another 16 percent were two to 2.9 hectares. Twelve percent were three hectares or bigger, with one respondent reporting a farm of 6.3 hectares. Total farm size averaged 2.2 hectares in the critically-denuded areas, ranging from 0.2 to 8.6 hectares (Figure 8).

The average farm holding of households in partially-denuded areas (Appendix Table A4) was slightly smaller for flat lands (mean = 0.5 ha.) but larger for hilly farms (mean = 2.3 ha.) and larger for the total farm size (mean = 2.8 ha.) when compared with households in the critically-denuded areas. Of those with flat farms 76 percent reported areas of less than one hectare; the majority of those with hilly farms had one to almost three hectares.

Sources of food. Among the respondents in critically-denuded areas whose farms were suitable to the cultivation of cereals, corn (98%) and rice (60%), were the chief

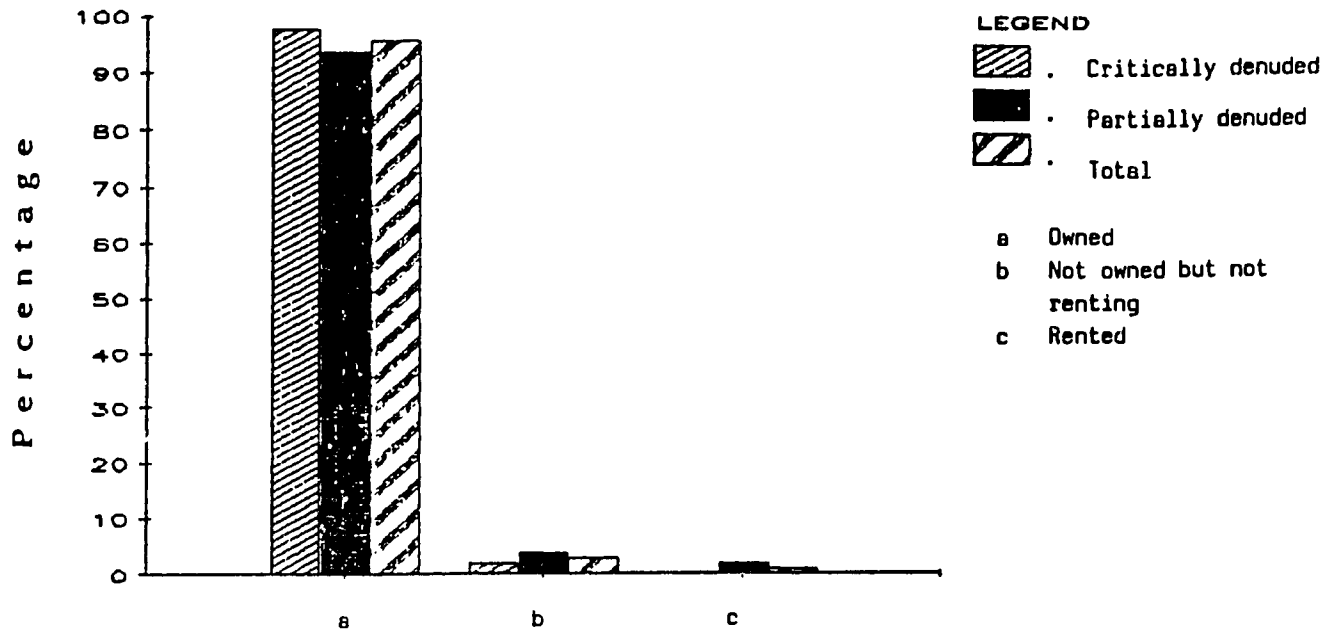


Figure 2. House ownership among households in critically-denuded and partially-denuded sites.

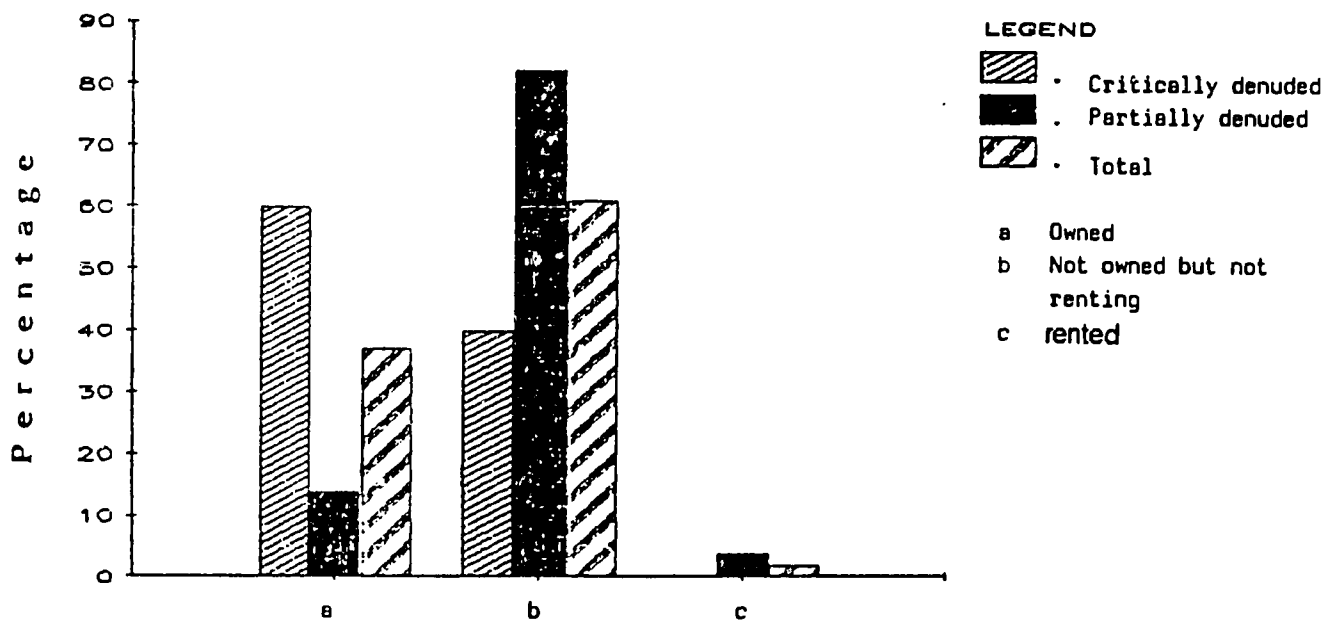


Figure 3. House-lot ownership among households in critically-denuded and partially-dnuded sites.

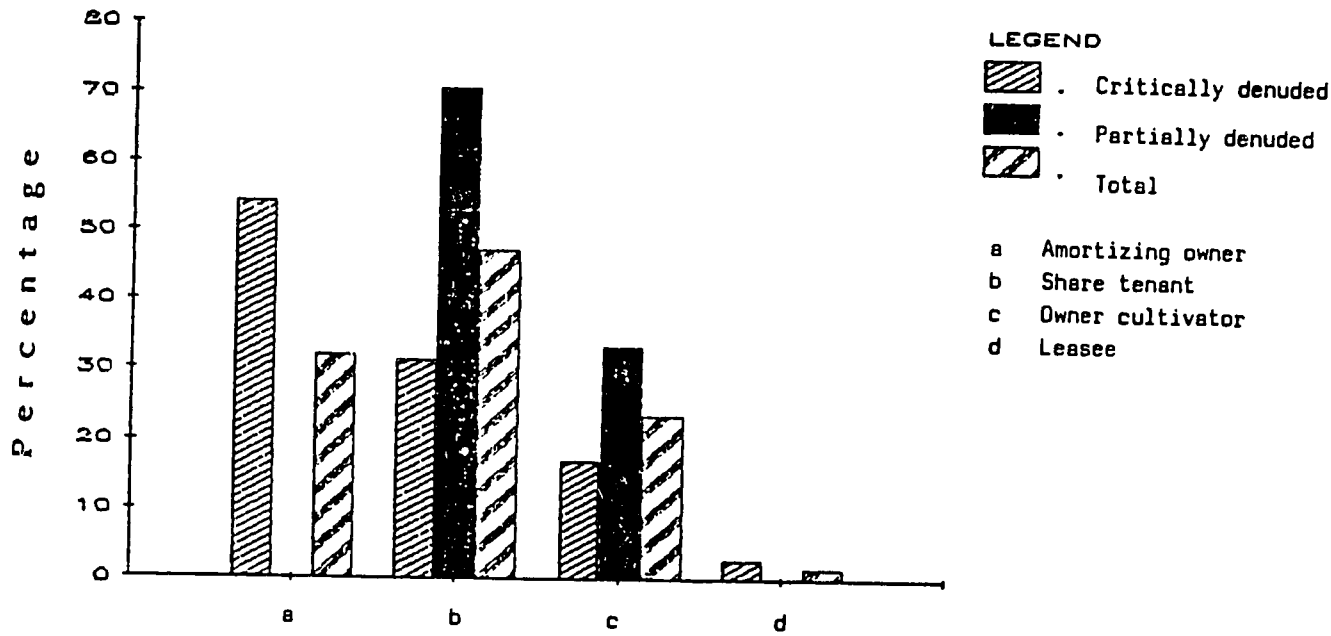


Figure 4. Tenurial status of flat farms among households in critically-denuded and partially-denuded sites.

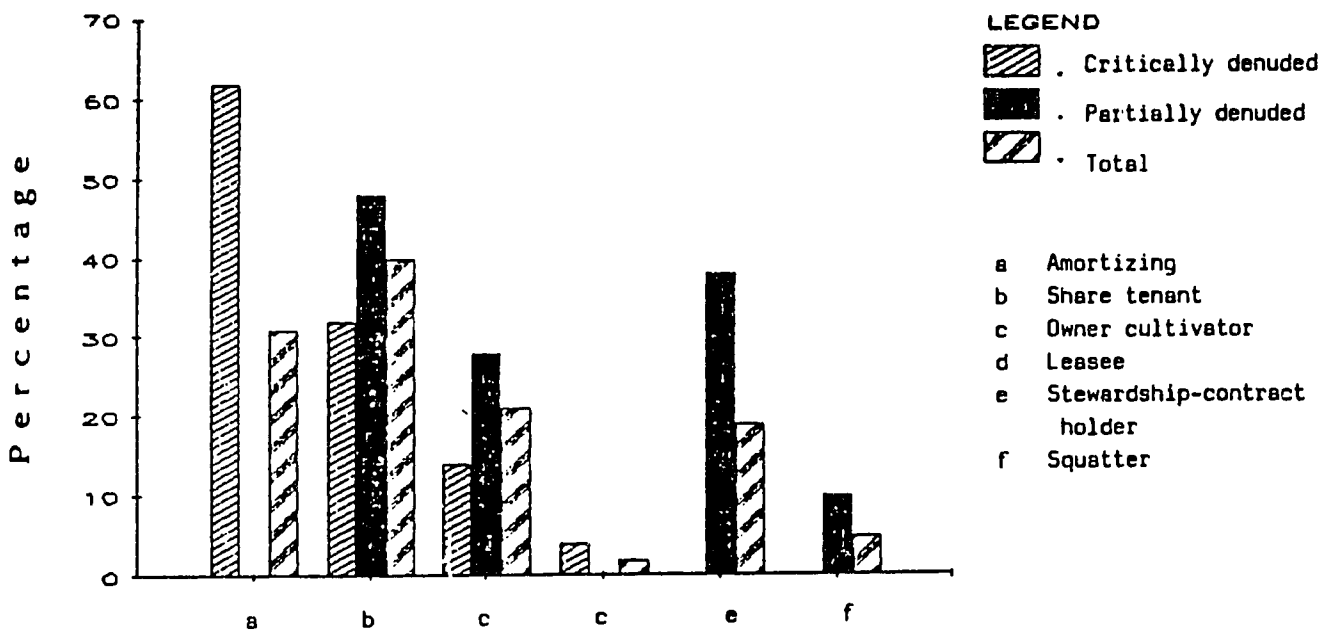
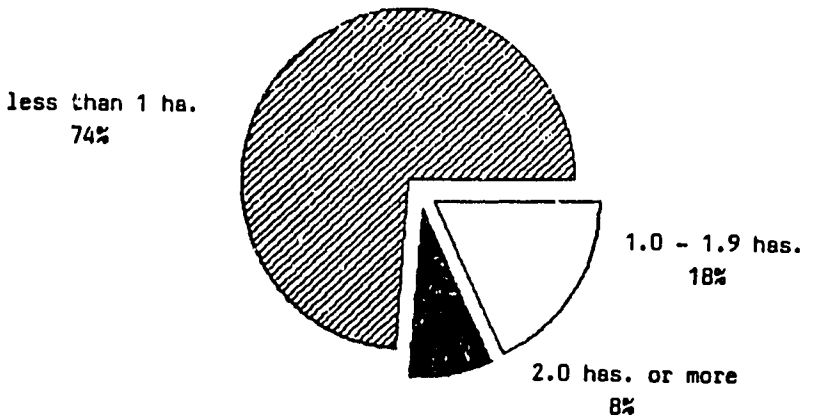
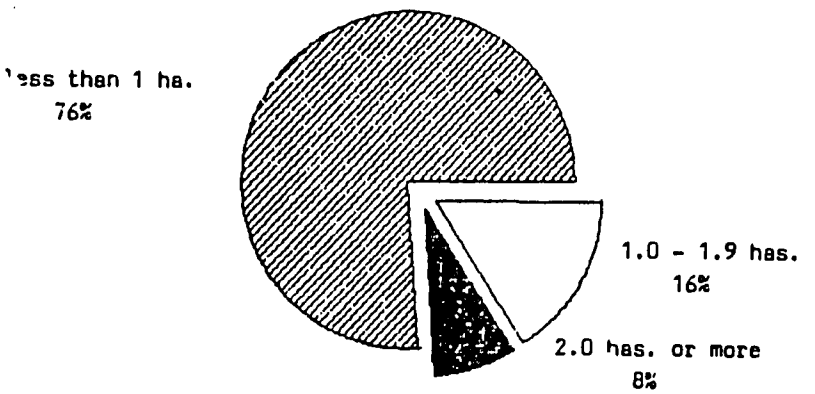


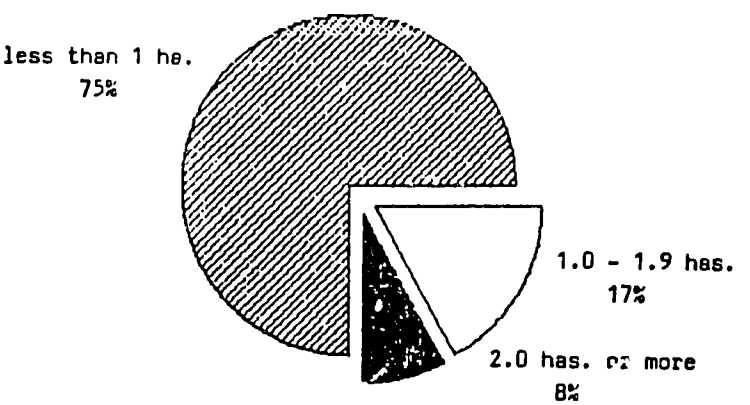
Figure 5. Tenurial status of sloping farms among households in critically-denuded and partially-denuded sites.



Critically-Denuded Sites

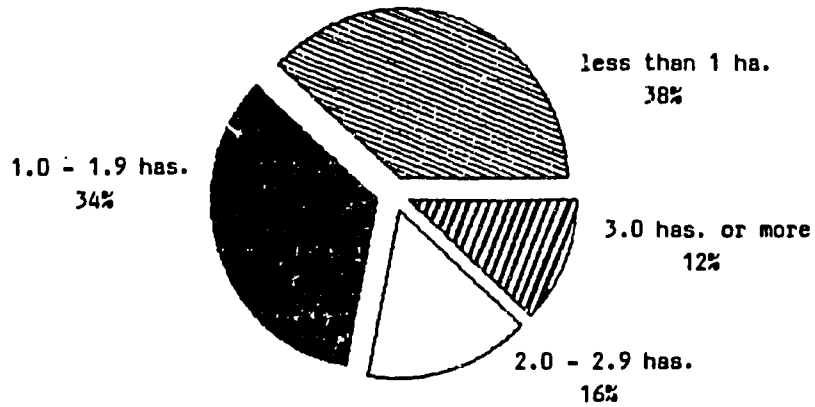


Partially-Denuded Sites

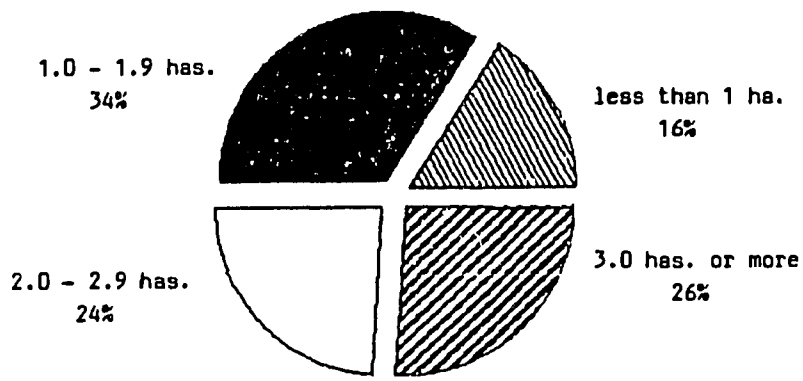


All Study Sites

Figure 6. Size of flat farms among households in critically-denuded sites, partially-denuded sites, and all study sites.



Critically-denuded Sites



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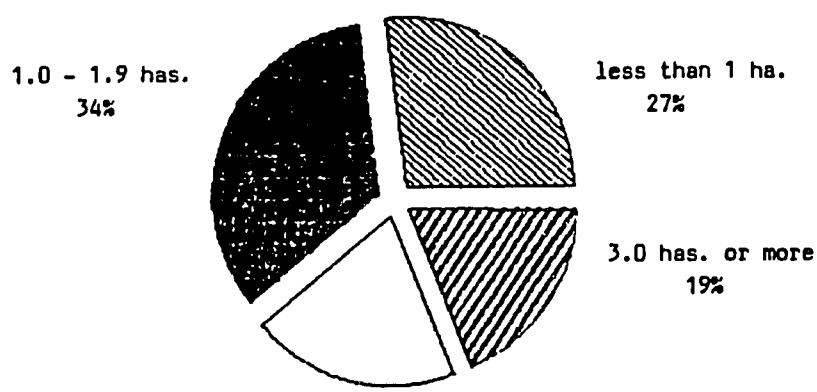
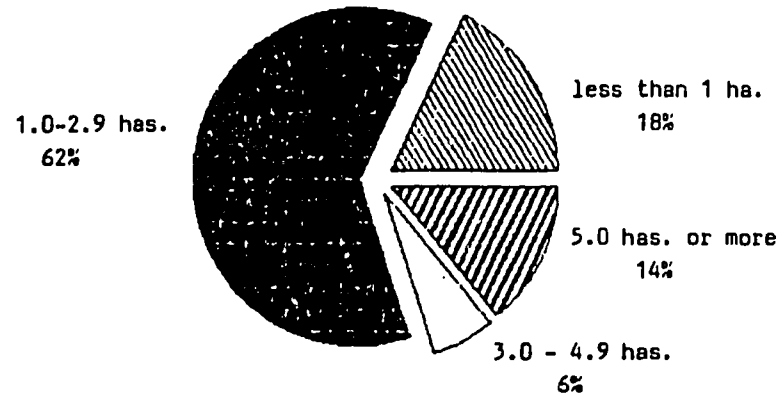
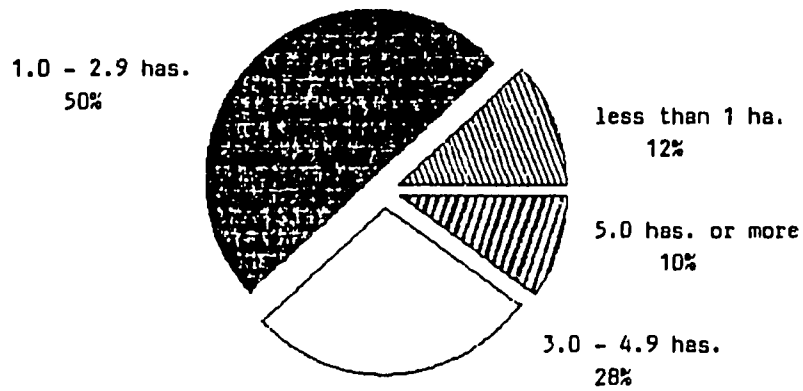


All Study Sites

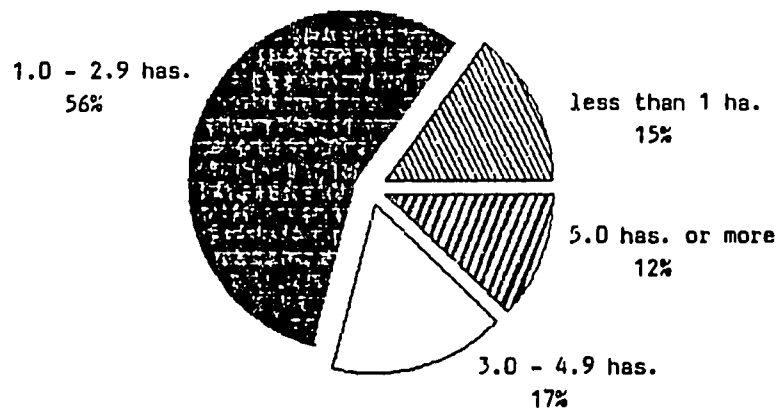
Figure 7. Size of sloping farms among households in critically-denuded sites, partially-denuded sites, and all study sites.



Critically-Denuded Sites



Partially-Denuded Sites



All Study Sites

Figure 8. Total size of farms among households in critically-denuded sites, partially-denuded sites and all study sites.

staple foods (Table 2). In addition to cereals, in particular for those respondents who could no longer support cereal production on this farms, sweet potato (72%), cassava (66%), and banana (44%) were grown for food. Forty-two percent reported they purchased their food, while a few earned some of their food in exchange for their services. Among the households in the partially-denuded areas only 40 and 8 percent reported having cultivated rice and corn, respectively, for food. The majority reported, banana (90%), sweet potato (64%), and cassava (52%) as this is major food crops. Additionally 86 percent claimed they purchased their food supplies, as compared to only 42 percent of the households from the critically-denuded sites.

Sources of cash income. The major sources of cash income (Table 3) for the respondents in the critically-denuded areas were the sales from their agricultural products, particularly pigs (70% of the households) and chickens (70%) and some farm products (corn, mungbean, sweet potato, banana, coconut, rice, and others). Few who grow corn and rice derived cash income from these products because they were predominantly consumed by the farm household. Only those who produced more than they needed for food were likely to sell their cereal products. None of the households in the critically-denuded areas reported any cash income from forest product.

Table 2. Sources of food in critically-denuded and partially-denuded sites*

Sources	Critically Denuded (n= 50)		Partially Denuded (n= 50)		Total (N= 100)	
	n	%	n	%	n	%
Agricultural Sources						
Rice	30	60.0	20	40.0	50	50.0
Corn	49	98.0	4	8.0	53	53.0
Banana	22	44.0	45	90.0	67	67.0
Sweet potato	36	72.0	32	64.0	68	68.0
Cassava	33	66.0	26	52.0	59	59.0
Yautia	-	-	17	34.0	17	17.0
Gabi	-	-	1	2.0	1	1.0
Other Sources						
Purchased	21	42.0	43	86.0	64	64.0
Exchanged forlabor	6	12.0	2	4.0	8	8.0

* Multiple response

Table 3. Sources of cash income in critically-denuded and partially-denuded sites *

Sources	Critically Denuded (n= 50)		Partially Denuded (n= 50)		Total (N= 100)	
	n	%	n	%	N	%
Agricultural Sources						
Crops:						
Corn	23	46.0	2	4.0	25	25.0
Rice	14	28.0	11	22.0	25	25.0
Mungbean	18	36.0	1	2.0	19	19.0
Peanut	8	16.0	1	2.0	9	9.0
Sweet potato	17	34.0	17	34.0	34	34.0
Cassava	7	14.0	6	12.0	13	13.0
Yautia	-	-	11	22.0	11	11.0
Coconut	14	28.0	34	68.0	48	48.0
Abaca	-	-	31	62.0	31	31.0
Banana	17	34.0	22	44.0	39	39.0
Tobacco	8	16.0	-	-	8	8.0
Livestock/Poultry:						
Pig	35	70.0	20	40.0	55	55.0
Chicken	35	70.0	14	28.0	49	49.0
Goat	2	4.0	-	-	2	2.0
Forest Products:						
Bamboo	-	-	4	8.0	4	4.0
Firewood	-	-	7	14.0	7	7.0
Sawn Timber	-	-	7	14.0	7	7.0
Other Sources						
Labor	8	16.0	30	60.0	38	38.0
Money from children	8	16.0	8	16.0	16	16.0
Farm products trading	4	8.0	-	-	4	4.0
Sari-sari store	5	10.0	4	8.0	9	9.0
Tuba gathering	-	-	9	18.0	9	9.0

* Multiple response

In partially-denuded villages the majority of respondents earned cash income from sales of coconut and abaca products and as wages for labor in various activities. Other sources of cash income were banana, sweet potato, chickens, rice, yautia, and others. Few reported earning cash from forest products.

Data on household incomes were not available in both sites for two reasons: (1) most respondents were not willing to give information on their income and (2) even those willing to give information seldom keep records of their income, especially farm products which were consumed. Observations on the general living conditions of the households, however, revealed strong indications that a large majority, if not all of the households, lived below the poverty level.

Perceived ways of increasing food supply and cash income. Respondents from the critically-denuded areas perceived that they could increase their food supply and cash income (Appendix Tables A5 and A6) by intensifying their efforts in the production of corn (52%), the chief staple food in the area, and rice (34%). On the other hand, 36 percent of the respondents in the partially-denuded areas thought they could increase their food supply by purchasing food by increasing their incomes from their coconut farms and by seeking outside employment.

Agricultural Production in the Uplands

This section details the agricultural production systems in the critically-denuded and partially-denuded areas covered in the study. The problems in agricultural production perceived by the respondents, their causes and perceived solutions are also discussed.

Crop production. Crops constitute an important source of food as well as cash income for the respondents. In the critically-denuded villages (Figure 8 and Appendix Table A4), population pressure as evidenced by very small farmsizes (80% of families have farms smaller than 3 hectares), is reflected in cropping patterns (Table 4) that seek to maximize food availability for the household. Cereals and root crops were the most important crops grown by the majority of the households surveyed in critically-denuded areas (Table 5). Only a minority of the respondents produced cash crops such as mungbean, peanut, and tobacco (Table 5 and Appendix Table A5).

A large percentage of the respondents who tilled sloping areas in critically-denuded sites practiced highly nutrient-depleting cropping patterns. The only exceptions were a few who planted legumes, particularly mungbean (Table 4).

Table 4. Cropping patterns on various farms in critically-denuded and partially-denuded sites *

Cropping Pattern	Critically Denuded n	%	Partially Denuded n	%	Total N	%
Flat: Ricefields	(n= 32)		(n= 20)		(N= 52)	
Rice-rice-fallow	27	84.4	-	-	27	51.9
Rice-rice-legume	3	9.4	-	-	3	5.8
Rice-tobacco-fallow	1	3.1	-	-	1	1.9
Rice-rice-corn	1	3.1	-	-	1	1.9
All rice	-	-	20	100.0	20	38.5
Flat: Non-Ricefields	(n= 26)		(n= 6)		(N= 32)	
Corn-legume-corn	14	53.9	-	-	14	43.8
Tobacco-corn-fallow	3	11.5	-	-	3	9.4
Corn-root crop-corn	4	15.4	-	-	4	12.5
Legume-corn-root crop	2	7.7	-	-	2	6.2
Corn-corn-fallow	1	3.8	-	-	1	3.1
Corn-fallow-root crop	1	3.8	-	-	1	3.1
Tobacco-corn-tobacco	1	3.8	-	-	1	3.1
All root crops	-	-	2	33.3	2	6.2
Corn-root crop-root crop	-	-	1	16.6	1	3.1
No definite cropping pattern	-	-	3	50.0	3	9.4
Sloping Farms	(n= 50)		(n= 50)		(N= 100)	
All root crops	5	10.0	16	32.0	21	21.0
Corn-root crop-root crop	7	14.0	4	8.0	11	11.0
Corn-root crop-corn	18	36.0	1	2.0	19	19.0
Corn-legume-corn	13	26.0	-	-	13	13.0
Legume-corn-root crop	3	6.0	1	2.0	4	4.0
Corn-fallow-root crop	1	2.0	-	-	1	1.0
Corn-corn-fallow	2	4.0	-	-	2	2.0
No definite cropping pattern	1	2.0	28	56.0	29	29.0

* Multiple response

Table 5. Crops grown in flat and sloping farms by sites *

Crops Grown	Critically Denuded		Partially Denuded		Total	
	n	%	n	%	N	%
Flat Farms	(n= 35)		(n= 24)		(N= 59)	
Rice	25	71.4	19	79.2	44	74.6
Corn	19	54.3	-	-	19	32.2
Mungbean	8	22.8	-	-	8	13.6
Peanut	3	8.6	1	4.2	4	6.8
Tobacco	5	14.3	1	4.2	6	10.2
Cassava	3	8.6	3	12.5	6	10.2
Sweet potato	4	11.4	3	12.5	7	11.9
Sloping Farms	(n= 50)		(n= 47)		(N= 97)	
Sweet potato	31	62.0	28	59.6	59	60.8
Yautia	2	4.0	36	76.6	38	39.2
Cassava	32	64.0	23	48.9	55	56.7
Corn	46	92.0	6	12.8	52	48.4
Mungbean	17	34.0	2	4.2	19	19.6
Peanut	16	32.0	-	-	16	16.5

* Multiple response

Majority of the respondents in the partially-denuded sites did not follow any definite cropping pattern (56%); while some continuously planted one crop in the same area such as rice in the flat farms and root crops in the hilly areas.

The problems perceived by the respondents in both sites that affect their crop production can be classified into three types: problems with the soil, problems with crops, and problems with resources and services (Table 6). Infertile soil was identified as a major problem by 92 percent of the respondents in the critically-denuded sites. Interestingly only 46 percent believed that the primary factor causing the problem was soil erosion (Table 7). Low crop yield (62%) was identified by the respondents in the critically-denuded areas as another major problem, which resulted from use of marginal or poor soil, unfavorable climate, monocropping or non-rotation of crops and damage from stray animals.

Table 6. Perceived farm problems of households by sites *

Problems	Critically Denuded (n= 50)		Partially Denuded (n= 50)		Total (N= 100)	
	n	%	n	%	N	%
Soil						
Infertile	46	92.0	10	20.0	56	56.0
Crops						
Low yield	31	62.0	11	22.0	42	42.0
Resources & Services						
Lack of capital	27	54.0	7	14.0	34	34.0
Poor equipment	4	8.0	2	4.0	6	6.0
Lack of farm equipment	3	6.0	-	-	3	3.0
Lack of access to information	1	2.0	-	-	1	1.0
Poor maintenance of equipment	-	-	1	2.0	1	1.0
No problem	-	-	22	44.0	22	22.0

* Multiple response

Four specific problems on resources and services were mentioned by respondents in critically-denuded areas: lack of capital, poor equipment, lack of equipment, and lack of information. The farm households' low income was identified as the major cause of this group of problems.

In distinct contrast, nearly half, or 44 percent of the households in partially-denuded areas reported no problem with their farms (Table 6). Of the remainder who said they had problems, low yield (22%), infertile soil (20%), and lack of capital (14%) were the problems most commonly mentioned. Low income (32%) and soil erosion (21%) were the two factors the respondents perceived as major causes of their farm problems.

Table 7. Perceived causes of farm problems by sites *

Causes	Critically Denuded (n= 50)		Partially Denuded (n= 28)		Total (N= 78)	
	n	%	n	%	N	%
Soil erosion	23	46.0	6	21.4	29	37.2
Marginal soil	18	36.0	3	10.7	21	26.9
Pests and diseases	7	14.0	4	14.3	11	14.1
Monocropping	6	12.0	4	14.3	10	12.8
Low income	22	44.0	9	32.1	31	39.7
Unfavorable climate	7	14.0	1	3.6	8	10.2
Stray animals	1	2.0	1	3.6	2	2.6
Lack of manpower	-	-	2	7.1	2	2.6

* Multiple response

Although all the respondents from the critically-denuded sites reported farm problems, 50 percent said they had not tried any solutions (Table 8). In the partially-denuded villages, while the majority reported they had farm problems only 57 percent of those who reported problems had some idea of possible solutions. The other 45 percent probably felt they had no control of the situation due to limited or total lack of resources, particularly capital and information.

Table 8. Perceived solutions to farm problems by sites *

Causes	Critically Denuded (n= 50)		Partially Denuded (n= 28)		Total (N= 78)	
	n	%	n	%	N	%
Restore soil fertility (fallowing,planting legumes, etc.)	15	30.0	1	3.6	16	20.5
Improve cultural management practices	7	14.0	6	21.4	13	16.7
Use of inorganic fertilizer	5	10.0	-	-	5	6.4
Contour farming	-	-	3	10.7	3	3.9
Increase capitalization	2	4.0	2	7.1	4	5.1
Use of better equipment	2	4.0	1	3.6	3	3.9
Use of insecticides/ pesticides	1	2.0	2	7.1	3	3.9
Employ labor to help in farm work	6	12.0	2	7.1	8	10.3
No solutions tried	25	50.0	12	42.8	37	47.4

* Multiple response

Animal production. Chickens, pigs, and carabaos, raised in small scale, constituted the common farm animals of the majority of households in the critically-denuded areas (Table 9 and Appendix Table A7). Chickens, although primarily raised for home consumption were often sold for cash during emergencies. Pigs, on the other hand, were raised more for sale and for the harvest rituals and other celebrations than for day-to-day home use. Carabaos were used mainly as draft animals and were only sold or butchered if injured or too old and weak to work. Cattle and horses were not commonly raised possibly due to the high cost both in acquiring and raising the animals. Goats were not raised by some households because of the potential crop damage they might cause. Turkeys were raised in only on critically-denuded village.

Table 9. Animals raised in critically-denuded and partially-denuded sites *

Animals Raised	Critically Denuded (n= 50) n	%	Partially Denuded (n= 50) n	%	Total (N= 100) N	%
Chicken	47	94.0	39	78.0	86	86.0
Pig	38	76.0	41	82.0	79	79.0
Carabao	33	66.0	8	16.0	41	41.0
Duck	1	2.0	2	4.0	3	3.0
Cattle	2	4.0	1	2.0	3	3.0
Goat	15	30.0	1	2.0	16	16.0
Turkey	9	18.0	-	-	9	9.0
Horse	2	4.0	-	-	2	2.0
No animal raised	1	2.0	2	4.0	3	3.0

* Multiple response

Forty-four percent of the respondents in the critically-denuded sites reported they had no problems related to animal production (Table 10). Of those who said they had problems, those most commonly mentioned were 1) lack of feeds (36%) and 2) pests and diseases (34%). A few respondents were also concerned with the lack of water both for drinking and for wallowing and/or bathing the animals. In contrast respondents from the partially-denuded areas reported diseases (32%) as their major animal problem; lack of feed (18%) was second.

Table 10. Problems in animal production of households in critically-denuded and partially-denuded sites *

Problems	Critically Denuded (n= 50) n	%	Partially Denuded (n= 50) n	%	Total (N= 100) N	%
Feeds supply	18	36.0	9	18.0	27	27.0
Diseases	17	34.0	16	32.0	33	33.0
Wallowing pond	2	4.0	-	-	2	2.0
Water supply	2	4.0	-	-	2	2.0
No problems reported	22	44.0	27	54.0	49	49.0

*Multiple response

Among those in the critically-denuded villages who tried solutions to their problems in animal production (Table 11), use of feed supplements (ipil-ipil) to increase the feed supply (28%), and vaccination or use of drugs to combat diseases (12%) were commonly mentioned. Among the respondents in the partially-denuded sites an equal percentage (26%) each perceived use of feed supplements and medicines as possible remedies to their problems.

Table 11. Solutions to problems in animal production of households in critically-denuded and partially-denuded sites

Solutions	Critically Denuded (n= 50)		Partially Denuded (n= 23)		Total (N= 73)	
	n	%	n	%	N	%
Use of feed supplements (ipil-ipil, root crops, kangkong)	14	28.0	6	26.1	20	27.4
Use of medicine	6	12.0	6	26.1	12	16.4
Fetch water for drinking and wallowing	4	8.0	-	-	4	5.5
No solutions tried	30	60.0	13	56.5	43	58.9

* Multiple response

Membership in organizations

Some respondents in the critically-denuded villages and in one partially-denuded area reported membership in local organizations (Table 12). Almost half of the respondents (47%) from both sites were, however, not members in any organization. Respondents in both sites claimed membership in Farmers Associations, Death Aid Associations, and some government-formed village organizations.

Table 12. Membership of respondents in local organizations by sites *

Organizations	Critically Denuded (n= 50)		Partially Denuded (n= 50)		Total (N= 100)	
	n	%	n	%	N	%
San Jose Farmers Association	6	12.0	-	-	6	6.0
San Miguel Farmers Association	1	2.0	-	-	1	1.0
Death-Aid Association	10	20.0	-	-	10	10.0
Agrarian Reform Beneficiary Association	8	16.0	-	-	8	8.0
Samahang Nayon	4	8.0	-	-	4	4.0
Kansungka Farmers Association	-	-	23	46.0	23	23.0
Kansungka Upland Farmers Association	-	-	19	38.0	19	19.0
Not members in any organization	23	46.0	24	48.0	47	47.0

* Multiple response

CHAPTER III
THE TREE COMPONENT OF UPLAND FARMING SYSTEMS

This section highlights the role of trees and other perennials in current upland farming systems in the study sites. Discussion will center on the most common species, their uses, and cultural management practices.

Before discussing the types of tree species found in upland farms, an overview of the interrelationships among the important sub-components of upland farming systems (crops, trees, and livestock) is first presented. It can be gleaned from the diagram in Figure 9 that while trees can play a multiplicity of roles in upland and hillside farming systems, more concrete linkages among the sub-components have yet to be internalized in the systems. Food and tree crops, for instance, still exist as independent sub-components of farming systems in most upland farms in Eastern Visayas, although potential linkages (as represented by broken arrows) can be established through integrated land management schemes (e.g. agroforestry). This may take a long time to become reality since most upland farmers in the region operate at the subsistence level, and food production seems the only logical thing for them to do in order to survive. Any attempt to introduce "new technologies" to the farmers must be able to address their subsistence and consumption needs at the same time as meeting conservation needs. The ability of multipurpose trees to address both food productivity and soil conservation objectives simultaneously offers promising prospects for better land productivity in the uplands.

Types of Trees in Upland Farming Systems

Fruit trees. The most common fruit tree species found in respondents' farms, both in partially-and critically-denuded sites, were guava, star apple, avocado and jackfruit (Appendix Table A8). No clear differences exist between the sites in patterns of use of fruit trees, that is, farmers' practices, preferences and attitudes toward fruit tree growing are similar in both areas, except for obvious deviations due to inherent differences in site conditions.

Guava, which survives under very marginal conditions and is easily propagated through seeds, was not planted intentionally by the majority of the respondents in both sites. "The guava trees just grew" from seeds scattered by eaters. In the case of jackfruit and star apple, the majority of the respondents in both sites intentionally planted them. Except for avocado, only a few respondents (2-20%) planted other types of fruit trees. It should be mentioned here that although there was a wide diversity of fruit trees grown in the study sites (33 species), there were usually only a few of each species, especially those in the critically-denuded sites. In terms of tree

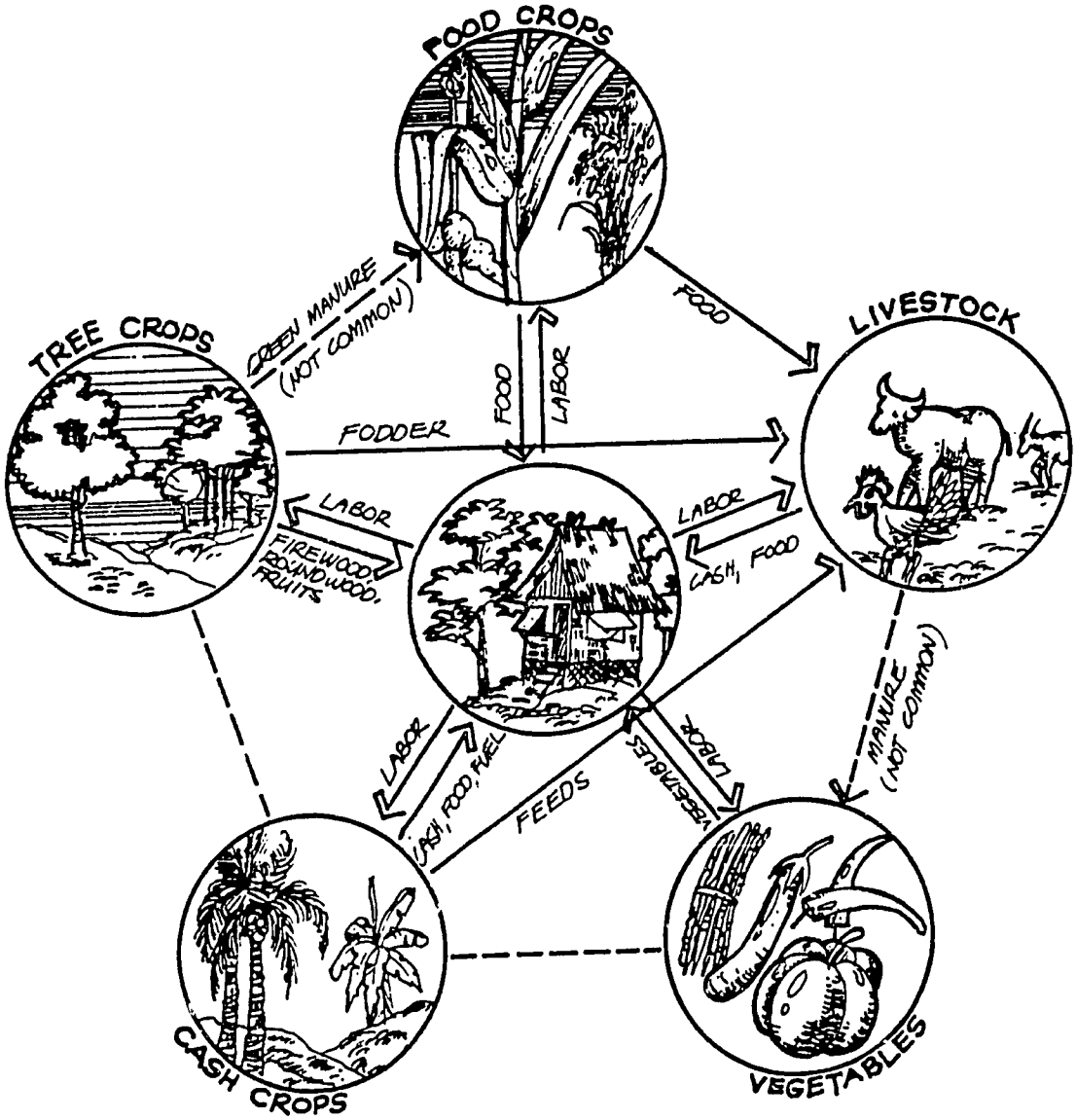


Figure 9. Schematic diagram showing the interrelationship among the different sub-components of an upland farming system (based from Nair and Sreedharan, 1986 as reproduced by Bajracharya, 1987).

location (Table 13), those that grow to a considerable size such as jackfruit, mango, and avocado are usually planted near the house while the guavas are usually located in the farms.

Uses of most common fruit trees are shown in Tables 14 and 15. Generally, they were grown mainly for home consumption, although farmers from the partially-denuded sites also considered fruit trees as source of cash income. The relatively more productive conditions in the partially-denuded sites and the availability of market outlets for fruit-tree products contributed to the sale of some of this fruit. In contrast, the severe scarcity of food in the critically-denuded sites does not permit most farmers to sell any of their farm produce.

Table 13. Location of fruit-tree species *

Location	Critically Denuded (n= 41) P	Critically Denuded (n= 49) NP	Partially Denuded (n= 39) P	Partially Denuded (n= 47) NP	Total (N= 80) P	Total (N= 96) NP
Farm						
Boundaries	10.0	13.9	2.1	12.9	6.2	13.5
Along contours	2.0	-	-	-	1.0	-
Specific location not specified	92.0	86.0	93.6	77.4	92.8	82.4
Near the House	76.0	30.2	36.2	16.1	56.7	24.3

* Multiple response
P - Planted NP - Not Planted

Table 14. Uses of Fruit Trees and Fruit-Tree Products *

Uses	Critically Denuded (n= 50) P	Critically Denuded (n= 43) NP	Partially Denuded (n= 47) P	Partially Denuded (n= 30) NP	Total (N= 97) P	Total (N= 73) NP
Fruits						
Consumed at home	96.0	100.0	95.7	100.0	95.9	100.0
Sold	16.0	2.3	68.1	10.0	41.2	5.5
Other Uses						
Soil erosion control	74.0	51.2	80.8	63.3	77.3	56.2
Windbreak	34.0	6.9	25.5	6.7	29.9	6.8
Firewood	22.0	55.8	23.4	20.0	22.7	41.1
Shade	66.0	23.2	42.6	23.3	54.6	23.3
Soil improver	2.0	2.3	10.6	3.3	6.2	2.7
Construction materials	10.0	4.6	6.4	6.7	8.2	5.5
Medicine	-	2.3	-	-	-	1.3

* Multiple response

P - Planted NP - Not Planted

Table 15. Current small-farm uses of fruit-tree species

Local/Common	Scientific Names	Uses
Caimito	Chrysophyllum cainito	Food, fuel, post
Jackfruit	Artocarpus heterophylla	Food, bolo handle, chopping board, chisel handle, base of coconut grater, pestle, post, corn sheller
Guava	Psidium guajava	Food, chisel handle, bolo handle, ax handle
Santol	Sandoricum koetjape	Food, fuel, bolo handle
Mango	Mangifera indica	Food
Avocado	Persia americana	Food, bolo handle
Guayavano	Annona muricata	Food
Lanzones	Lansium domesticum	Food
Pomelo	Citrus grandis	Food
Tamarind	Tamarindus indica	Food, Chopping board
Kamachile	Pithecellobium dulce	Mortar, chopping board, soil improver
Rambutan	Nephelium lappaceum	Food
Iba	Averrhoa bilimbi	Food, Pick mattock handle
Others		
Coconut	Cocos nucifera	Food, fuel, construction material, post,base of coconut grater, chair
Banana	Musa spp.	Food
Papaya	Carica papaya	Food

Fruit trees, aside from being a source of food, also served as sources of wood for posts, household tools/utensils and farm implements. Other uses of fruit trees included firewood, windbreak, soil improvement, shade, and for soil erosion control, although most respondents almost always referred to coconut and banana for these particular uses.

In terms of cultural management, fruit trees were given little care (Table 16). Except for weeding during the early stages of growth, fruit trees were left to grow in the field or near the home untended.

Non-fruit tree species. The non-fruit tree species currently utilized by farmers are shown in Appendix Table A9. As expected, a wider range of species was found in the partially-denuded sites than in the critically-denuded sites. However, while many traditionally-used species were utilized by the respondents in the partially-denuded sites, these species were for the most part not directly incorporated in their farming systems (i.e. not intentionally planted). Their farms were simply situated near or within forested areas from which they collected wood for fuel, posts, construction material, and other uses.

As shown in Appendix Table A9, a total of 18 species of trees, four of which are leguminous MPTS, were grown by the farmers. Interestingly, despite socio-economic pressures in the critically-denuded sites which necessitated the utilization of marginal lands for agricultural production, farmers still grew trees on their lands, especially on fallowed lots, borders, and eroded areas where cultivation of annual crops was no longer economical. Unlike their counterparts from the partially-denuded sites who often do not worry about wood and other forest products, these farmers are often compelled to grow trees in order to meet their fuelwood and other farmwood needs. Those who have access to coconut stands, however, generally do not feel any pressure to grow trees on their farms. Since Leyte is basically a coconut-producing province the use of coconut fronds, husks, and shells for fuel is very common among small farmers in the region.

Table 16. Farmers' management practices in fruit tree growing *

Management Practices	Critically Denuded (n= 50) P	Critically Denuded (n= 43) NP	Partially Denuded (n= 47) P	Partially Denuded (n= 32) NP	Total (N= 97) P	Total (N± 75) NP
Weeding	74.0	16.3	93.6	18.8	83.5	17.3
Fertilizer application	4.0	2.3	4.2	-	4.1	1.3
Smudging	4.0	-	6.4	-	5.2	-
Pruning	6.0	-	2.1	3.1	4.1	1.3
None	24.0	83.7	6.4	78.1	15.5	81.3

* Multiple response

P - planted NP - not planted

Normally, trees were planted with very minimal care and management (Table 17) along farm borders and on small woodlots where trees, usually ipil-ipil, were planted either at random or contiguously along hillsides. Planting of trees along contours (as hedgerows) is still not common among the respondents. Many of the respondents in both critically- and partially-denuded sites could not specify the exact location of trees on their farms (Table 18).

Table 17. Farmers' management practices in non-fruit tree growing *

Management Practices	Critically Denuded (n= 42) P	Critically Denuded (n= 49) NP	Partially Denuded (n= 39) P	Partially Denuded (n= 47) NP	Total (N= 81) P	Total (N= 96) NP
Weeding	59.5	20.4	79.5	27.6	69.1	23.9
Pruning	14.3	2.0	15.4	8.5	14.8	5.2
None	38.0	77.6	10.2	65.9	24.7	71.9

* Multiple response
P - planted NP - not planted

Table 18. Location of non-fruit tree species *

Location	Critically Denuded (n= 41) P	Critically Denuded (n= 49) NP	Partially Denuded (n= 39) P	Partially Denuded (n= 47) NP	Total (N= 80) P	Total (N= 96) NP
Farm						
Boundaries	4.9	8.2	5.1	40.4	5.0	24.0
Along contours	-	-	2.6	-	1.2	-
Cannot Specify location	80.5	97.9	92.3	82.9	86.2	90.6
Near the House	63.4	20.4	5.1	6.4	35.0	13.5

* Multiple response
P - Planted NP - Not Planted

The current small-farm uses of non-fruit trees are reflected in Table 19. It is clear that trees have been used by farmers in a number of ways, from sources of wood for fuel, construction, and farm and household tools/implements to a source of fodder for livestock. However, unlike their counterparts in the partially-denuded sites who can easily collect traditional tree species for various uses, farmers in the critically-denuded sites had to rely heavily on very few species (ipil-ipil, madre de cacao, acasia, and coconut). These farmers often do not have any alternative but to use species which are not very suitable in terms of their physical properties. The very scarce timber resources in the critically-denuded sites, coupled with the low income of the farmers, are the most important explanations for this fact.

Table 19. Current small-farm uses of non-fruit tree/shrub species

Local/Common	Scientific Names	Uses
Ipil-ipil	Leucaena leucocephala	Fuel, soil improvement ,fodder, post, construction material, tool handle (bolo, pick mattock, ax, chisel, hammer), farm and household implements (plow, harrow, yoke, mortar, pestle, corn grinder, chopping board, corn sheller), crafts, table
Acacia	Samanea saman	Fuel, bolo handle, soil improvement, kitchen tools (chopping board & mortar) corn sheller, table, chair, corn grinder, ganta, posts, base of coconut grater
Molave	Vitex parviflora	Fuel, chopping board, mortar, chair, table, posts, tool handle, crafts, construction material, base of coconut grater, corn sheller
Lauan	Shorea spp.	Fuel, posts, construction material, chopping board, base of coconut grater, crafts, chair , table , pestle, ganta, tool handle,
Binunga	Macaranga tanarius	Fuel, coconut grater, table, tool handle, construction material, corn sheller,
Guisok	Shorea gisok	Posts, construction material, chopping board, fuel, crafts, chair, coconut grater, mortar, pestle, tool handle, body component of plow, harrow, abaca stripper
Anislag	Securinega flexuosa	Construction material, posts, crafts, chair fuel
Toog	Combretodendron quadrialatum	Construction material, chopping board, chair, posts, fuel

Table 19. (Continued)

Local/Common Names	Scientific Names	Uses
Tindalo	Pahudia rhomboidea	Construction material, harrow, fuel
Yakal	Shorea malibato	Construction material, posts, table, fuel, tool handle, body component of yoke, plow, harrow, stripper
Madre de cacao	Gliricidia sepium	Construction material, soil improvement, insecticides, trellis
Bangkal	Nauclea orientalis	Construction material, chair, ganta, medicine
Narra	Pterocarpus indicus	Table, chair, construction material, fuel, bed base of coconut grater, chopping board, mortar, tool handle, body component of abaca stripper, construction material
Dao	Dracontamelon dao	Construction material, chopping board, chair, mortar, furniture
Bagalunga	Melia dubia	Table, fuel
Alagasi	Ducosyke capitellata	Fuel, base of coconut grater
Malubago	Abutilon indicus	Fuel, base of coconut grater, body component of corn sheller, tool handle
Putian	Alangium meyeri	Posts
Apitong	Dipterocarpus grandiflorus	Posts, construction material
Nato	Palaquium luzoniense	Construction material
Antipolo	Artocarpus blancoi	Construction material, chair, table, base of coconut grater, mortar, tool handle
Hambabalud	Broussonetia luzonicum	Construction material
Dalindingan	Hopea acuminata	Construction material

Table 19. (Continued)

Local/Common Names	Scientific Names	Uses
Balubo	Diplodiscus paniculatus	Tool handle, construction material
Tambalau	Knema glomerata	Tool handle, chair
Isis	Ficus ulmifolia	Tool handle, pestle
Lagnob	Ficus septica	Tool handle
Others		
Bamboo	Bambusa spp.	Construction material, furniture, crafts. chair, table, laddle, seed container, fuel, winnowing basket
Rattan	Calamus spp.	Crafts

Fuelwood and Fodder Utilization By Upland Farmers

Fuelwood Utilization. Table 20 shows differences between the two sites in the types of fuel used by farmers. While in the critically-denuded sites the most common materials used as fuel by farmers were ipil-ipil and coconut, those from the partially-denuded sites relied heavily on coconut materials and firewood collected from the forest. As expected, a wider range of fuel materials is available to farmers from the partially-denuded sites.

Data from Table 21 indicate that the majority of farmers from the critically-denuded sites recognized this fuelwood supply was getting scarcer and more difficult to obtain, which they attributed to the rapid depletion of woody perennials in their locality. However, some did not consider fuelwood supply as a critical problem because of the presence of ipil-ipil woodlots in their own farms and/or the availability of alternate fuels such as coconut fronds, husks and shells. The majority of farmers from the partially-denuded sites, on the other hand, did not consider fuelwood supply as a critical problem, understandably because of their proximity to the forest. Unfortunately, even with the growing awareness that fuelwood resources are getting scarcer, it seems that tree growing is generally not regarded by farmers as a necessary component of their farming systems. This attitude may be attributed to

the heavy pressure for the farmers to produce food from small holdings of infertile lands and the many years it takes to grow trees. Good access to forest resources and alternate fuels are undoubtedly major factors that cause farmers' low motivation to grow trees for firewood.

Table 20. Materials used as fuel for various purposes *

Uses/Species	Critically Denuded n	Critically Denuded %	Partially Denuded n	Partially Denuded %	Total N	Total %
For Cooking food	(n= 50)		(n= 50)		(N= 100)	
Ipil-ipil	44	88.0	2	4.0	46	46.0
Coconut fronds	8	16.0	28	56.0	36	36.0
Coconut husks with shell	2	4.0	5	10.0	7	7.0
Narra	-	-	1	2.0	1	1.0
Molave	-	-	1	2.0	1	1.0
Hanagdong	-	-	1	2.0	1	1.0
Hanggakutan	-	-	1	2.0	1	1.0
Others collected from the forest	-	-	22	44.0	22	22.0
For Cooking animal feeds	(n= 31)		(n= 36)		(N= 67)	
Ipil-ipil	18	58.1	3	8.3	21	31.3
Coconut fronds	5	16.1	15	41.7	20	29.8
Coconut husks with shell	11	35.5	6	16.7	17	25.3
Bamboo	1	3.2	-	-	1	1.5
Molave	-	-	1	2.8	1	1.5
Hanagdong	-	-	1	2.8	1	1.5
Others collected from the forest	-	-	15	41.7	15	22.4
For Ironing clothes (charcoal)	(n= 27)		(n= 14)		(N= 41)	
Coconut shell	14	51.8	14	100.0	28	68.0
Ipil-ipil	12	44.4	-	-	12	29.3
Guava	1	3.7	-	-	1	2.4

* Multiple response

Table 21. Farmers' responses to the question on whether fuelwood is as easy to get today as it was three or five years ago

Response	Reasons*	Critically Denuded (n=50) n	%	Partially Denuded (n=50) n	%	Total (N=100) N	%
Easy		42.0		54.0		48.0	
		(n= 21)		(n= 31)		(N= 52)	
	Have access to coconut fronds/ husks/shells	6	28.6	21	67.7	27	51.9
	Owns ipil-ipil woodlot	9	42.8	-	-	9	17.3
	Have access to the forest	-	-	11	35.5	11	21.2
	Not certain	6	28.6	-	-	6	11.5
Difficult		52.0		40.0		46.0	
		(n= 28)		(n= 18)		(N= 46)	
	Have more access to trees before	19	67.8	8	44.4	27	58.7
	Increased number of firewood users/collectors	12	42.8	1	5.6	13	28.3
	Firewood source is far	-	-	11	61.1	11	23.9
The same		6.0		6.0		6.0	

* Multiple response

Fodder Utilization. The types of fodder plants used by farmers are shown in Table 22. Those most commonly used by farmers were ipil-ipil leaves, banana (inner portion of stem), and napier grass in the critically-denuded sites and root crops, ipil-ipil leaves, and kangkong in the partially-denuded sites. These fodder plants were used only as supplementary feeds (in combination with standard feeds from either rice or corn) because the majority of the respondents in both sites usually do not collect fodder plants for their animals. The most common practice among upland farmers is to let their animals "feed or graze by themselves" in the field. As a result the problem of stray animals intruding into other farmers' crops is often prevalent in these areas.

With regard to the source of fodder plants used by farmers (Table 23), the majority of respondents in both critically- and partially-denuded sites said they collected fodder from their own farms, especially on idle or fallowed parcels. Only a few collected fodder from wastelands or from their neighbors' farms.

The problems encountered by farmers with fodder plants are shown in Table 24. The majority of farmers in both critically- and partially-denuded sites (57% and 70%, respectively) reported they had no problems at all with fodder, but some respondents from the critically-denuded sites (33.3%) mentioned the psyllid infestation on ipil-ipil leaves as a major problem. At the time of the survey, ipil-ipil trees were just beginning to recover from the infestation which started sometime in 1984.

Table 22. Fodder plants used by farmers *

Fodder Plants	Critically Denuded (n=50)		Partially Denuded (n= 50)		Total (N= 100)	
	n	%	n	%	N	%
Ipil-ipil	16	32.0	5	10.0	21	21.0
Bogang/napier grass	3	6.0	-	-	3	3.0
Banana	2	4.0	-	-	2	2.0
Camote/other root crops	-	-	19	38.0	19	38.0
Kangkong	-	-	1	2.0	1	1.0
Not using	32	64.0	26	52.0	58	58.0

* Multiple response

Table 23. Source of fodder plants used by farmers *

Source	Critically Denuded (n= 19)		Partially Denuded (n= 7)		Total (N= 26)	
	n	%	n	%	N	%
Own farm	17	89.5	5	71.4	22	84.6
Wasteland	2	10.5	3	42.8	5	19.2
Neighbor	1	5.3	-	-	1	3.8

* Multiple response

Table 24. Problems with fodder plants reported by farmers

Problems	Critically Denuded (n= 21)		Partially Denuded (n= 10)		Total (N= 31)	
	n	%	n	%	N	%
Psyllid infestation on ipil-ipil leaves	7	33.3	-	-	7	22.6
Limited supply during dry season	2	9.5	3	30.0	5	16.1
No problem reported/ not using	12	57.1	7	70.0	19	61.3

Preferred Tree Species and Characteristics

The tree species and characteristics preferred by farmers for various end-uses are shown in Appendix Tables A10, A11, and A12. It can be readily seen that in the critically-denuded sites, the tree species preferred by farmers were more or less confined to a few locally available species while in the partially-denuded sites, farmers' preferences were much more varied, obviously because more tree species abound in their locality. Interestingly, the heavy reliance of farmers from the critically-denuded sites on ipil-ipil for fuel, fodder, and soil improvement influenced them to prefer this species.

The preferred characteristics of trees for various uses are somewhat similar for the partially- and critically-denuded sites. The respondents from the critically-denuded sites, however, did not mention anything about preferred characteristics for handicrafts because this particular activity is not common in their locality.

A general lack of consensus was observed on the desirable characteristics of tree species for fodder in both critically- and partially-denuded sites. This may be attributed to three factors: low popularity of tree-fodder use among farmers, low level of development of the livestock component of their farming system, and the presence of other sources of feeds for livestock.

It should also be noted that all the desirable properties mentioned refer to the product per se. Nothing was mentioned with regard to the desirable characteristics of ease in growing the tree crops such as resistance to pests and diseases and the ability of the trees to grow fast with little or no care. This fact perhaps reflects the current status of tree growing in the study sites: trees are not systematically planted or cared for by farmers. As observed in the four study sites, trees were randomly planted, and care and management were minimal.

Potential Uses of MPTS on Small Upland Farms

The present state of upland farms in the study sites, particularly of the soil, offers excellent chances for MPTS to play a key role in existing upland-farming systems. Multipurpose trees, especially the nitrogen-fixing ones, can be integrated with food crops and fallow systems to help stabilize soil conditions in relatively shorter periods of time. As mentioned earlier, alley cropping is still foreign to many of the farmers, as is the concept of improved fallow using leguminous plant species. If farmers, and researchers alike, can be made to realize the importance of stabilizing the environment (soil) first before looking at the possibility of improving crop yield through the adoption of introduced (supposedly tested) cropping patterns, then the introduction of MPTS for farm-level use will not be too difficult a task.

Many of the traditional tree species used by farmers are getting scarcer and more difficult to obtain (Table 25). But studies and experience have shown that many MPTS can substitute for these traditional species. Giant ipil-ipil, for instance, has not only been proven to be a good material for fuel, fodder, and posts, but also a substitute for narra (*Pterocarpus indicus*) in furniture making. Other species like yemane (*Gmelina arborea*) and *Acacia mangium* offer promising prospects for farm-level utilization by small farmers.

Some of the introduced tree species, including other perennial crops like coffee and cacao which are planted by few farmers, are shown in Table 26. When asked about the performance of these introduced species, the majority of respondents in both

critically- and partially-denuded sites said they had no idea at all, probably because of limited contact with the species. Some mentioned fast growth, straight bole, adaptability, and multiple uses as indicators of satisfactory performance (Table 27).

With regard to the farmers' perceptions about community-based forestry projects (eg. communal tree planting), the majority (78%) of respondents from the critically-denuded sites did not have any definite idea or perceptions at all, but some mentioned possible benefits like a regular source of construction materials (48%) and of additional cash income (22%), and soil and ecology-related benefits (2-4%) (Table 29). In contrast, the majority of respondents from the partially-denuded sites had very positive perceptions about the beneficial effects of community forestry projects in their locality. Only 18 percent of the respondents did not have any idea at all. The higher level of awareness about community forestry in the partially-denuded sites may be due to the fact that many of the farmers, especially those from Kansungka, are beneficiaries of the Integrated Social Forestry Project (ISFP) of the then Bureau of Forest Development (now Forest Management Bureau under the Department of Environment and Natural Resources). Under this ISF Project (which started sometime in 1982) farmers enter into a stewardship agreement with the government, which entitles them to a 25-year renewable lease on the land.

When asked about the availability of vacant lots for tree-planting purposes, the majority of respondents in both critically- and partially-denuded sites said they had no vacant lots or they had no idea at all (Table 29). This reaction perhaps reflects on the critical and worsening issue of land availability as a result of increasing population and socio-economic pressures in the uplands and the increasing land-use competition for food production.

Table 25. Traditionally-used tree species now difficult to obtain by farmers*

Tree Species	Scientific Names	Critically Denuded (n= 50) n	%	Partially Denuded (n= 50) n	%	Total (N= 100) N	%
Molave	Vitex parviflora	45	90.0	36	72.0	81	81.0
Lauan	Shorea contarta	13	26.0	12	24.0	25	25.0
Toog	Combretodendron quadrialatum	12	24.0	7	14.0	19	19.0
Guisok	Shorea gisok	11	22.0	13	26.0	24	24.0
Yakal	Shorea malibato	7	14.0	15	30.0	22	22.0
Narra	Pterocarpus indicus	3	6.0	22	44.0	25	25.0
Dalingdingan	Hopea acuminata	-	-	5	10.0	5	5.0
Banitlong	Macaranga bicolor	2	4.0	-	-	2	2.0
Binunga	Macaranga tanarius	2	4.0	-	-	2	2.0
Antipolo	Artocarpus blancoi	-	-	1	2.0	1	1.0
Tindalo	Pahudia rhomboidea	-	-	5	10.0	5	5.0
Mangkono	Xanthostermon verdugonianus	-	-	1	2.0	1	1.0

* Multiple response

Table 26. Introduced tree species in the study sites *

Tree Species	Scientific Names	Critically Denuded (n= 50) n	%	Partially Denuded (n= 50) n	%	Total (N= 100) N	%
Giant ipil-ipil	Leucaena leucocephala	16	32.0	15	30.0	31	31.0
Madre de cacao	Gliricidia sepium	3	6.0	13	26.0	16	16.0
Yemane	Gmelina arborea	12	24.0	-	-	12	12.0
Bogo	Garuga floribunda	3	6.0	-	-	3	3.0
Durian	Durio zibethinus	-	-	1	2.0	1	1.0
Coffee	Cofea excelsa	-	-	1	2.0	1	1.0
Cacao	Theobroma cacao	-	-	1	2.0	1	1.0
No data		18	36.0	20	40.0	38	38.0

* Multiple response

Table 27. Farmers' evaluation of performance of introduced tree species in the study sites*

Performance/ Species	Critically Denuded (n=24) n	%	Partially Denuded (n= 30) n	%	Total (N= 54) N	%
Fast growth (yemane, giant ipil-ipil)	9	37.5	4	13.3	13	24.1
Straight bole (yemane, giant ipil-ipil)	-	-	2	6.7	2	3.7
Adaptable to local condition (giant ipil-ipil, bogo, madre de cacao)	3	12.5	4	13.3	7	12.9
With multiple uses (giant ipil-ipil, madre de cacao)	3	12.5	8	26.7	11	20.4
No idea	12	50.0	13	43.3	25	46.3

* Multiple response

Table 28. Farmers 'perceived benefits from and problems with community forestry projects *

Perceived Benefits/ Problems	Critically Denuded (n=50)		Partially Denuded (n= 50)		Total (N= 100)	
	n	%	n	%	N	%
Perceived Benefits						
Source of construction materials	24	48.0	30	60.0	54	54.0
Conservation of ecological balance	-	-	9	18.0	9	9.0
Source of additional cash income	11	22.0	19	38.0	30	30.0
Prevention of soil erosion	2	4.0	11	22.0	13	13.0
Conservation of soil fertility	1	2.0	4	8.0	5	5.0
No idea	39	78.0	9	18.0	48	48.0
Perceived Problems						
Limited land resource	5	10.0	8	16.0	13	13.0
Care and management	4	8.0	5	10.0	9	18.0
Source of planting materials	3	6.0	1	2.0	4	4.0
Stunted growth due to poor soil condition	5	10.0	1	2.0	6	6.0
No idea	8	16.0	24	48.0	32	32.0
None	25	50.0	11	22.0	36	36.0

* Multiple response

Table 29. Availability of vacant land for tree planting in the study sites

Response	Critically Denuded (n=50)		Partially Denuded (n= 50)		Total (N= 100)	
	n	%	n	%	N	%
Plenty	6	12.0	1	2.0	7	7.0
Few	12	24.0	10	20.0	22	22.2
None	14	28.0	36	72.0	50	50.0
No idea	18	36.0	3	6.0	21	21.0

CHAPTER IV
SUMMARY, CONCLUSIONS AND GENERALIZATIONS

Summary

This study was conducted to determine the socio-demographic profile of small upland farmers and the current small-farm uses of multipurpose tree species (MPTS). Two critically-denuded and two partially-denuded upland communities in Leyte (Eastern Visayas), Philippines were selected as study sites. Data were collected through a combination of observation and formal and informal interviews with 25 household heads in each site.

The respondents in both sites were in their late forties while their spouses were three to four years younger. The average educational attainment of all respondents was three years. Households in the critically-denuded sites were smaller with fewer children. Almost all owned their houses but few owned their house lots. Their total farms averaged over two hectares; more from the critically-denuded sites mortgaged their farms while most from the other sites were share tenants. Very few were owner cultivators. Respondents from both sites practiced nutrient-depleting cropping patterns, but more from the critically-denuded sites than from the other sites reported infertile soil and low yield as major farm problems which some attributed as effects of soil erosion. Most households in the critically-denuded sites grew cereals for food and earned cash income from raising animals, those from the other sites purchased their food with their income from coconut and abaca and from wage employment.

Ipil-ipil (Leucaena leucocephala) and, to a very limited extent, madre de cacao (Gliricidia sepium) were grown by farmers with some regularity. However, these species were often not planted in a productive arrangement with food crops as in most agroforestry schemes. Alley cropping and improved fallow systems are still foreign concepts to many upland farmers in the region.

Fruit and non-fruit tree species were used by farmers in a number of ways, from sources of wood for fuel, posts, construction materials, furniture, handicrafts, household tools/utensils, and farm implements to sources of food, fodder for livestock, and to a very limited extent green manure for soil improvement. Farmers from the critically-denuded sites relied heavily on very few locally available tree species, mostly ipil-ipil, madre de cacao, and acasia (Samanea saman), while those from the partially-denuded sites utilized a wider range of tree species, many of which were collected from the forest. It was observed that when people have access to forest resources and alternate sources of fuel (e.g. coconut materials), their

motivation to grow trees is generally low, especially under subsistence farming conditions. Even with the respondents' awareness of the growing problem of fuelwood/fodder scarcity in their locality, tree growing seemed to play only second priority to the more fundamental concern of food production.

Conclusions and Generalizations

Focusing through the main highlights of the study, the following conclusions and generalizations can be made:

(1) The households studied in the four upland villages in Leyte perhaps typify other households located in similar conditions in many parts of the country: low educational attainment, low income, small landholding, meager facilities, and limited access to resources and services.

(2) The population pressure, as evidenced by small landholding, and the critical need of food supply for the family have produced a cropping system which maximizes immediate needs for food at the sacrifice of long-term benefits such as the preservation of the ecology to sustain food productivity. The farmers' erosive cultivation techniques put further pressure on the land, thus making it more untenable for them to make long-term investments in land improvement such as contour farming, organic additions (e.g. mulching), and improved fallow systems.

(3) While tree species played critical roles in the uplands not only in providing materials for fuel, construction, and fodder, but also in helping minimize further ecological destruction, only very few of them are truly incorporated in current upland-farming systems. In fact, right now, only ipil-ipil can be legitimately called a multipurpose tree species that is currently grown by small upland farmers. Yet even this tree species is often not planted by farmers in some productive arrangement with food crops, albeit its potential role in helping farmers address their subsistence and conservation needs simultaneously cannot be denied.

(4) Data reveal that farmers, especially those from the critically-denuded sites, do recognize the phenomenon of soil erosion as the main cause of low land productivity in the uplands. But they generally regard this phenomenon either as inevitable or something beyond their control,hence soil-erosion-control measures are usually not included among their priorities. If these farmers can be convinced of the importance of stabilizing the soil before appreciable improvements in crop yields can be gained, farmers' adoption of multipurpose trees as an integral part of their farming systems will not be difficult to imagine. The point here is that the integration of trees with food crops can only be internalized in current farming systems if farmers are convinced of the beneficial effect of trees on soil productivity and crop yield.

(5) It has been observed that where people have access to forest resources and alternate sources of fuel, motivation to grow trees is generally low. Although many of the farmers from the partially-denuded sites are beneficiaries of the government's Integrated Social Forestry Program (ISFP), few of them have grown trees on their farms. Surprisingly, even in areas as critically-denuded as San Jose and Barangbang, farmers often do not feel the pressure to grow trees for their fuel and other farm needs.

(6) It can be said that the importance of trees among uplanders only plays a distant second priority to the more fundamental concern of producing food for the family. Thus, any attempt to introduce multipurpose-tree species to the farmers through community- or social-forestry projects must seek to include components dealing with food or livelihood of the people. Failure to look at the problem of food supply and income will likely result in a conflict between the need for ecological preservation and the need for food. And past lessons have shown that the need for food always prevails.

(7) In addressing the acute problem of food supply and income in the uplands, there is undoubtedly a need to look at the role of fruit trees in current upland-farming systems. Although present practice in the study sites shows that fruit trees are mainly grown for home consumption, it has been shown by some farmers that when conditions are favorable, fruit-trees can also be a substantial source of cash income.

(8) The high consensus among the respondents in terms of the preferred characteristics of species for various uses should provide foresters and tree breeders an insight into the premium placed by the users on the desired specifications or properties. In other words, while tree breeders may attempt to produce trees that are fast-growing and hardy, equally important are the properties of the tree itself desired by the end users.

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APPENDIX I
STUDY METHODOLOGY

The Samples

Respondents for this study were upland farmers cultivating sloping areas in Leyte province (Eastern Visayas), Philippines. The uplands were categorized into two types, critically-denuded and partially-denuded sites. To select the sample sites, the researchers visited villages which belonged to each of the two categories. Two communities in each category were selected based on the extent of denudation in the area, the dominance of hilly or sloping farms, and other bio-physical features typical of the present conditions in Eastern Visayas. Twenty-five respondents were randomly selected from households in each of the four study sites.

The Instrument

The interview schedule was first developed and refined in English before it was translated into Cebuano, the language of the respondents. The Cebuano instrument was pre-tested in an upland village which had comparable characteristics as the study sites. Corresponding revisions were made based on the results of the pre-test. The instrument included items on socio-economic and demographic characteristics; agricultural production data; perceived needs and problems related to agricultural production; current small-farm uses of tree or shrub species; and preferred tree species and characteristics for specific uses.

Pertinent data from the four study sites were collected through a combination of formal and informal interviews with the respondents. Trained interviewers hired by the Center for Social Research in Small-Farmer Development (CSR-SFD) of the Visayas State College of Agriculture (ViSCA) collected the data from 100 respondents from February through May, 1988.

In addition to the data collected from the interviews, information was gathered from secondary sources and from direct observation through household and farm visits by the project and study leaders.

Data Analysis

Collected data were edited, coded, entered and analyzed with the use of the computer facilities at the CSR-SFD. Descriptive statistics were estimated to facilitate the analysis and interpretation of the data. Means, standard deviations, ranges, frequencies, sums, and percentages were calculated to describe the variables of interest.

APPENDIX II. TABLES A1 THROUGH A12

Table A1. Distribution of households by selected socio-demographic characteristics by sites

Variables	Critically Denuded n	%	Partially Denuded n	%	Total N	%
Ages (years):						
Husbands	(n= 33)		(n= 50)		(N= 83)	
Below 25	2	6.0	1	2.0	3	3.6
26-35	6	18.2	7	14.0	13	15.7
36-45	6	18.2	18	36.0	24	28.9
46-55	8	24.2	13	26.0	21	25.3
56-65	6	18.2	7	14.0	13	15.7
66-above	5	15.2	4	8.0	9	10.8
Total:	33	100.0	50	100.0	83	100.0
Mean:	48.4		47.4		47.8	
Mode:	55.0		37.0		38.0	
Range:	25-70		21-81		21-81	
SD:	14.1		12.8		13.2	
Wives	(n= 31)		(n= 49)		(N= 80)	
Belows 25	2	6.5	3	6.1	5	6.3
26-35	8	25.8	7	14.3	15	18.8
36-45	5	16.0	17	34.7	22	27.4
46-55	10	32.3	14	28.6	24	30.0
56-65	6	19.4	6	12.2	12	15.0
66-above	-	-	2	4.1	2	2.5
Total:	31	100.0	49	100.0	80	100.0
Mean:	44.1		44.5		44.3	
Mode:	55		45		45	
Range	24-64		23-70		23-70	
SD:	12.4		11.1		11.6	

Table A1. (Continued)

Variables	Critically Denuded n	%	Partially Denuded n	%	Total N	%
Years of Formal Schooling:						
Husbands						
0	19	38.0	8	16.0	27	27.0
1-4	17	34.0	28	56.0	45	45.0
5-6	12	24.0	10	20.0	22	22.0
7-10	2	4.0	4	8.0	6	6.0
Total:	50	100.0	50	100.0	100	100.0
Mean:	2.6		3.5		3.1	
Mode:	0.0		2.0		0.0	
Range:	0-9		0-10		0-10	
SD:	2.6		2.6		2.6	
Wives						
0	17	34.0	8	16.0	25	25.0
1-4	20	40.0	24	48.0	44	44.0
5-6	11	22.0	13	26.0	24	24.0
7-10	2	4.0	5	10.0	7	7.0
Total	50	100.0	50	100.0	100	100.0
Mean:	2.7		3.7		3.2	
Mode:	0.0		6.0		0.0	
Range:	0-10		0-10		0-10	
SD:	2.5		2.7		2.6	
Household Size						
1-3	11	22.0	6	12.0	17	17.0
4-6	29	58.0	27	54.0	56	56.0
7-9	9	18.0	16	32.0	25	25.0
10 or more	1	2.0	1	2.0	2	2.0
Total:	50	100.0	50	100.0	100	100.0
Mean:	5.0		5.7		5.4	
Mode:	4.0		5.0		4.0	
Range:	1-14		2-10		1-14	
SD:	2.4		2.0		2.2	

Table A1. (Continued)

Variables	Critically Denuded n	%	Partially Denuded n	%	Total N	%
Number of Children						
None	-	-	1	2.0	1	1.0
1-3	16	32.0	16	32.0	32	32.0
4-6	25	50.0	16	32.0	41	41.0
7-9	8	16.0	13	26.0	21	21.0
10 or more	1	2.0	4	8.0	5	5.0
Total:	50	100.0	50	50.0	100	100.0
Mean:	4.8		5.1		5.0	
Mode :	3.0		4.0		3.0	
Range:	1-12		0-11		0-12	
SD:	2.1		2.8		2.5	
Number of Dependents						
None:	5	10.0*	1	2.0	6	6.0
1-2	20	40.0*	15	30.0	35	35.0
3-4	15	30.0*	18	36.0	33	33.0
5-6	7	14.0*	9	18.0	16	16.0
7 or more	3	6.0*	7	14.0	10	10.0
Total:	50	100.0	50	100.0	100	100.0
Mean:	3.1		3.8		3.4	
Mode:	2.0		2.0		2.0	
Range:	0-12		0-8		0-12	
SD:	2.3		2.0		2.2	
Age (years):						
Youngest Child	(n= 29)		(n= 49)		(N= 78)	
Below 1	5	17.2	6	12.2	11	14.2
1-5	10	34.5	12	24.5	22	28.2
6-10	5	17.2	14	28.6	19	24.4
11-15	7	24.2	6	12.3	13	16.7
16-above	2	6.9	11	22.4	13	16.7

* Include only members residing in the household

Table A1. (Continued)

Variables	Critically Denuded n	%	Partially Denuded n	%	Total N	%
Total:	29	100.0	49	100.0	78	100.0
Mean:	6.6		9.2		8.2	
Mode:	11.0		7.0		1.0	
Range:	0.2-18		0.2-26		0.2-26	
SD:	5.3		7.8		7.1	
Oldest Child	(n= 30)		(n= 49)		(N= 79)	
1-5	-	-	2	4.1	2	2.5
6-10	6	20.0	5	10.2	11	13.9
11-15	10	33.3	9	18.4	19	24.1
16-20	11	36.7	7	14.3	18	22.8
21-25	1	3.3	6	12.2	7	8.9
26-above	2	6.7	20	40.8	22	27.8
Total:	30	100.0	49	100.0	79	100.0
Mean:	15.5		22.5		19.8	
Mode:	14.0		12.0		14.0	
Range:	6-28		2-54		2-54	
SD:	5.8		11.4		10.2	

Table A2. House and house lot ownership of households by sites

Ownership	Critically Denuded (n= 50)		Partially Denuded (n= 50)		Total (N= 100)	
	n	%	n	%	N	%
House						
Owned	49	98.0	47	94.0	96	96.0
Not owned but not renting	1	2.0	2	4.0	3	3.0
Rented	-	-	1	2.0	1	1.0
House Lot						
Owned	30	60.0	7	14.0	37	37.0
Not owned but not renting	20	40.0	41	82.0	61	61.0
Rented	-	-	2	4.0	2	2.0

Table A3. Tenurial status of farms by sites*

Status	Critically Denuded		Partially Denuded		Total	
	n	%	n	%	N	%
Flat Farms	(n= 35)		(n= 24)		(N= 59)	
Amortizing owner	19	54.3	-	-	19	32.2
Share tenant	11	31.4	17	70.8	28	47.5
Owner cultivator	6	17.1	8	33.3	14	23.7
Leasee	1	2.9	-	-	1	1.7
Sloping Farms	(n= 50)		(n= 50)		(N= 100)	
Amortizing onwer	31	62.0	-	-	31	31.0
Share tenant	16	32.0	24	48.0	40	40.0
Owner cultivator	7	14.0	14	28.0	21	21.0
Leasee	2	4.0	-	-	2	2.0
Stewardship contract holder	-	-	19	38.0	19	19.0
Squatter	-	-	5	10.0	5	5.0

* Multiple response

Table A4. Size of farms of households by sites

Variables	Critically Denuded (n= 50) n	%	Partially Denuded (n= 50) n	%	Total (N= 100) N	%
Flat Areas						
Less than 1	37	74.0	38	76.0	75	75.0
1.0-1.9	9	18.0	8	16.0	17	17.0
2.0 or more	4	8.0	4	8.0	8	8.0
Total:	50	100.0	50	100.0	100	100.0
Mean:	0.6		0.5		0.5	
Mode:	0.0		0.0		0.0	
Range:	0-2.5		0-3		0-3	
SD:	0.7		0.7		0.7	
Sloping Areas						
Less than 1	19	38.0	8	16.0	27	27.0
1.0-1.9	17	34.0	17	34.0	34	34.0
2.0-2.9	8	16.0	12	24.0	20	20.0
3.0 or more	6	12.0	13	26.0	19	19.0
Total:	50	100.0	50	100.0	100	100.0
Mean:	1.6		2.3		2.0	
Mode:	1.0		1.0		1.0	
Range:	0.1-6.3		0.2-9.5		0.1-9.5	
SD:	1.5		2.1		1.8	
Total Area						
Less than 1	9	18.0	6	12.0	15	15.0
1.0-2.9	31	62.0	25	50.0	56	56.0
3.0-4.9	3	6.0	14	28.0	17	17.0
5.0 or more	7	14.0	5	10.0	12	12.0
Total:	50	100.0	50	100.0	100	100.0
Mean	2.2		2.8		2.5	
Mode:	1.0		2.0		2.0	
Range:	0.2-8.6		0.2-9.5		0.2-9.5	
SD:	1.7		2.1		1.9	

Table A5. Perceived ways of increasing food supply by sites*

Ways	Critically Denuded (n= 50)		Partially Denuded (n= 50)		Total (N= 100)	
	n	%	n	%	N	%
Increasing crop production						
Rice	17	34.0	15	30.0	32	32.0
Sweet potato	6	12.0	8	16.0	14	14.0
Banana	-	-	5	10.0	5	5.0
Corn	26	52.0	2	4.0	28	28.0
Cassava	1	2.0	-	-	1	1.0
Yautia	-	-	2	4.0	2	2.0
Other						
Purchase food	-	-	18	36.0	18	18.0

* Multiple response

Table A6. Perceived ways of increasing cash income by sites*

Ways	Critically Denuded (n= 50)		Partially Denuded (n= 50)		Total (N= 100)	
	n	%	n	%	N	%
Increase/engage in production of-						
Crops:						
Corn	5	10.0	-	-	5	5.0
Rice	2	4.0	1	2.0	3	3.0
Mungbean	4	8.0	-	-	4	4.0
Peanut	2	4.0	-	-	2	2.0
Sweet potato	1	2.0	-	-	1	1.0
Coconut	6	12.0	19	38.0	25	25.0
Abaca	-	-	2	4.0	2	2.0
Banana	1	2.0	3	6.0	4	4.0
Tobacco	4	8.0	-	-	4	4.0
Livestock/Poultry:						
Pig	3	6.0	-	-	3	3.0
Chicken	9	18.0	1	2.0	10	10.0
Turkey	1	2.0	-	-	1	1.0
Forest Products:						
Firewood	-	-	2	4.0	2	2.0
Sawn timber	-	-	5	10.0	5	5.0
Rattan	-	-	2	4.0	2	2.0
Others						
Outside employment	7	14.0	9	18.0	16	16.0
Farm products trading	3	6.0	-	-	3	3.0
Sari-sari store	-	-	3	6.0	3	3.0
Dress making	-	-	1	2.0	1	1.0
Handicraft making	-	-	1	2.0	1	1.0
Tuba gathering	-	-	3	6.0	3	3.0
Money from children	2	4.0	-	-	2	2.0

* Multiple response

Table A7. Distribution of animals raised by sites

Animal Raised/ Number	Critically Denuded (n= 50) n	%	Partially Denuded (n= 50) n	%	Total (N= 100) N	%
Carabaos						
None	17	34.0	42	84.0	59	59.0
1-2	30	60.0	8	16.0	38	38.0
3 or more	3	6.0	-	-	3	3.0
Total:	50	100.0	50	100.0	100	100.0
Mean:	1.1		0.2		0.7	
Mode:	0.0		0.0		0.0	
Range:	0-5		0-2		0-5	
SD:	1.1		0.6		1.0	
Pigs						
None	14	28.0	8	16.0	22	22.0
1-4	35	70.0	38	76.0	73	73.0
5 or more	1	2.0	4	8.0	5	5.0
Total:	50	100.0	50	100.0	100	100.0
Mean:	1.1		2.0		1.5	
Mode:	1.0		1.0		1.0	
Range:	0-5		0-13		0-13	
SD:	1.1		2.4		1.9	
Turkeys						
None	41	82.0	50	50.0	91	91.0
1-8	5	10.0	-	-	5	5.0
9 or more	4	8.0	-	-	4	4.0
Total:	50	100.0	50	100.0	100	100.0
Mean:	1.5		-		0.7	
Mode	0.0		-		0.0	
Range:	0-14		-		0-14	
SD:	3.5		-		2.6	

Table A7. (Continued)

Animal Raised/ Number	Critically Denuded (n= 50) n	%	Partially Denuded (n= 50) n	%	Total (N= 100) N	%
Cattle						
None	47	94.0	49	98.0	96	96.0
1-2	2	4.0	-	-	2	2.0
3 or more	1	2.0	1	2.0	2	2.0
Total:	50	100.0	50	100.0	100	100.0
Mean:	0.1		0.1		0.1	
Mode:	0.0		0.0		0.0	
Range:	0-4		0-7		0-7	
SD	0.6		1.0		0.8	
Chicken						
None	4	8.0	12	24.0	16	16.0
1-10	28	56.0	29	58.0	57	57.0
11-20	11	22.0	2	4.0	13	13.0
21 or more	7	14.0	7	14.0	14	14.0
Total:	50	100.0	50	100.0	100	100.0
Mean:	10.9		8.1		9.5	
Mode:	7.0		0.0		0.0	
Range:	0-65		0-50		0-65	
SD:	11.6		11.3		11.5	
Goat						
None	34	68.0	49	98.0	83	83.0
1-2	9	18.0	1	2.0	10	10.0
3 or more	7	14.0	-	-	7	7.0
Total:	50	100.0	50	100.0	100	100.0
Mean:	0.7		0.1		0.4	
Mode:	0.0		0.0		0.0	
Range	0-6		0-2		0-6	
SD	1.3		0.3		1.0	

Table A7. (Continued)

Animal Raised/ Number	Critically Denuded (n= 50) n	%	Partially Denuded (n= 50) n	%	Total (N= 100) N	%
Horse						
None	49	98.0	50	100.0	99	99.0
1-2	1	2.0	-	-	1	1.0
Total:	50	100.0	50	100.0	100	100.0
Mean:	0.04		-		0.02	
Mode:	0.0		0.0		0.0	
Range:	0-2		-		0-2	
SD:	0.3		-		0.2	
Duck						
None	49	98.0	48	96.0	97	97.0
1-8	1	2.0	1	2.0	2	2.0
9 or more	-	-	1	2.0	1	1.0
Total:	50	100.0	50	100.0	100	100.0
Mean:	0.1		0.3		0.2	
Mode:	0.0		0.0		0.0	
Range:	0-6		1-12		0-12	
SD:	0.8		1.7		1.4	

Table A8. Fruit trees found in respondents' farms *

Common/Local Names	Scientific Names	Critically Denuded (n=50) P	Critically Denuded (n=50) NP	Partially Denuded (n=50) P	Partially Denuded (n=50) NP	Total (N=100) P	Total (N=100) NP
Jackfruit	Artocarpus heterophylla	80.0	10.0	78.0	32.0	79.0	13.0
Guava	Psidium guajava	12.0	76.0	8.0	16.0	10.0	46.0
Star apple	Chrysophyllum caimito	42.0	6.0	38.0	-	40.0	3.0
Santol	Sandoricum koetjape	2.0	4.0	18.0	12.0	10.0	10.0
Pomelo	Citrus grandis	26.0	4.0	14.0	-	20.0	2.0
Avocado	Persea americana	26.0	2.0	28.0	4.0	27.0	3.0
Guayavano	Annona muricata	24.0	26.0	10.0	-	17.0	13.0
Balimbing	Averrhoa carambola	4.0	-	8.0	4.0	6.0	2.0
Mabolo	Diospyros philippinensis	-	-	6.0	2.0	3.0	1.0
Tambis	Syzygium aqueum	10 0	4.0	6.0	-	8.0	2.0
Iba (kamias)	Averrhoa bilimbi	-	4.0	4.0	-	2.0	2.0
Atis	Annona squamosa	10.0	6.0	-	-	5.0	3.0
Breadfruit	Artocarpus altilis	10.0	8.0	-	-	5.0	4.0
Mansanitas	Ziziphus mauritania	-	6.0	-	-	-	3.0
Kamachile	Pithecellobium dulce	-	12.0	-	-	-	6.0
Binukaw	Garcinia binucao	-	-	-	2.0	-	1.0
Durian	Durio zibethinus	-	-	4.0	-	2.0	-
Rambutan	Nephelium lappaceum	2.0	-	2.0	-	2.0	-
Sampalok	Tamarindus indica	6.0	-	2.0	-	4.0	-
Duhat	Syzigium cumini	12.0	-	-	-	6.0	-
Siniguelas	Spondias purpuria	8.0	-	-	-	4.0	-
Macopa	Syzygium samarangense	4.0	-	-	-	2.0	-
Limoncito	Triphacia trifolia	28.0	-	6.0	-	17.0	-
Tiesa	Ponteria camphiana	4.0	-	4.0	-	4.0	-

*Multiple response
P - Planted NP - Not Planted

Table A8. (Continued)

Common/Local Names	Scientific Names	Critically Denuded (n=50) P	Critically Denuded (n=50) NP	Partially Denuded (n=50) P	Partially Denuded (n=50) NP	Total (N=100) P	Total (N=100) NP
Mango	Mangifera indica	18.0	-	4.0	-	11.0	-
Marang banguhan	Artocarpus odoratissima		-	2.0	-	1.0	-
Lanzones	Lansium dometicum	-	-	8.0	-	4.0	-
Kamansi	Artocarpus communis	-	-	10.0	-	5.0	-
Others							
Banana	Musa sapientum	92.0	-	86.0	-	89.0	-
Coconut	Cocos nucifera	88.0	-	78.0	-	83.0	-
Papaya	Carica papaya	34.0	18.0	26.0	34.0	30.0	26.0
Cacao	Theobroma cacao	28.0	-	38.0	-	33.0	-
Coffee	Cofea excelsa	-	-	34.0	-	17.0	-

* Multiple response
P - Planted NP - Not Planted

Table A9. Non-fruit trees currently utilized by the respondents *

Common/Local Names	Scientific Names	Critically Denuded (n=50) P	Critically Denuded (n=50) NP	Partially Denuded (n=50) P	Partially Denuded (n=50) NP	Total (N=100) P	Total (N=100) NP
Native							
ipil-ipil	Leucaena leucocephala	46.0	66.0	14.0	8.0	30.0	37.0
Molave	Vitex parviflora	16.0	-	10.0	38.0	13.0	19.0
Bangkal	Nauclea orientales	2.0	6.0	-	-		
Dum-on	Antidesma ghaesambilla	2.0	2.0	-	-	1.0	1.0
Hanonom-o	Malutos philippinensis	2.0	2.0	-	-	1.0	1.0
Anislag	Securinega flexuaosa	2.0	2.0	-	1.0	1.0	2.0
Madre de cacao	Gliricidia sepium	12.0	6.0	8.0	4.0	10.0	5.0
Tuba-tuba	Croton tiglium	18.0	2.0	8.0	-	13.0	1.0
Banitlong	Macaranga bicolor	2.0	24.0	2.0	8.0	2.0	16.0
Narra	Pterocarpus indicus	-	-	2.0	42.0	1.0	21.0
Binunga	Macaranga tanarius	2.0	72.0	-	24.0	1.0	48.0
Acacia	Samanea saman	8.0	16.0	-	-	4.0	8.0
Bagalunga	Melia dubia	4.0	10.0	-	8.0	2.0	9.0
Antipolo	Artocarpus blancoi	-	-	4.0	20.0	2.0	10.0
Toog	Combretodendron quadrialatum	-	-	2.0	8.0	1.0	4.0
Giant							
ipil-ipil	Leucaena leucocephala	30.0	-	-	-	15.0	-
Yemane	Gmelina arborea	6.0	-	-	-	3.0	-
Cotton	Bombax malabarica	-	-	2.0	-	1.0	-
Kapok	Ceiba pentandra	-	6.0	-	2.0	-	4.0
Tibig	Ficus nota		-	-	28.0	-	14.0

Multiple response
P - Planted NP - Not Planted

Table A9. (Continued)

Common/Local Names	Scientific Names	Critically Denuded (n=50) P	Critically Denuded (n=50) NP	Partially Denuded (n=50) P	Partially Denuded (n=50) NP	Total (N=100) P	Total (N=100) NP
Malubago	Abutilon indicus	-	-	-	20.0		
Lagnob	Ficus septica	-	34.0	-	4.0	-	19.0
Balobo	Diplodiscus paniculatus	-	-	-	2.0	-	1.0
Kalingag	Cinnamomum mercadoi	-	-	-	2.0	-	1.0
Sudiang	Ctenolophon philippinensis	-	-	-	2.0	-	1.0
Alim	Manihot multiglandulosis	-	8.0	-	-	-	4.0
Lauan	Shorea spp.	-	-	-	28.0	-	14.0
Alagasi	Leucosyke capitellata	-	-	-	18.0	-	9.0
Hambabalud	Broussonetia luzonicum	-	-	-	18.0	-	9.0
Isis	Ficus ulmifolia	-	-	-	12.0	-	6.0
Guisok	Shorea gisok	-	-	-	10.0	-	5.0
Yakal	Shorea malibato	-	-	-	8.0	-	4.0
Talisay	Terminalia catapa	-	1.0	-	-	-	1.0
Balete	Ficus superba	-	-	-	8.0	-	4.0
Dapdap	Erythrina orientales	-	-	-	6.0	-	3.0
Taluto	Pterocymbium tinctorium	-	-	-	16.0	-	8.0
Gubas	Endospermum peltatum	-	-	-	4.0	-	2.0
Pugahan	Caryota cumingli	-	-	-	4.0	-	2.0
Tindalo	Pahudia rhomboidea	-	-	-	6.0	-	3.0
Dalindingan	Hopea acuminata	-	-	-	8.0	-	4.0
Bamban	Donax canneformis	-	-				

* Multiple response
P - Planted NP - Not Planted

Table A9. (Continued)

Common/Local Names	Scientific Names	Critically Denuded (n=50) P	Critically Denuded (n=50) NP	Partially Denuded (n=50) P	Partially Denuded (n=50) NP	Total (N=100) P	Total (N=100) NP
Dao	Dracontamelon dao	-	-	-	4.0	-	2.0
Hagimit	Ficus minahassae	-	-	-	2.0	-	1.0
Salingkugi	Albizia saponaria	-	-	-	2.0	-	1.0
Balanti	Homalanthus nopulneus	-	-	-	4.0	-	2.0
Bitanghol	Callophyllum blancoi	-	-	-	2.0	-	1.0
Guijo	Shorea guiso	-	-	-	4.0	-	2.0
Others							
Buri	Corypha clata	2.0	6.0	-	2.0	1.0	4.0
Bamboo	Bambusa spp.	-	36.0	-	38.0	-	37.0
Abaca	Musa textiles	-	-	64.0	-	32.0	-

* Multiple response

P - Planted NP - Not Planted

Table A10. Wood species used for various purposes *

Common/Local Names	Scientific Names	Critically Denuded (n=50) P	Critically Denuded (n=50) NP	Partially Denuded (n=50) P	Partially Denuded (n=50) NP	Total (N=100) P	Total (N=100) NP
Post		(n=6)		(n=26)		(N=32)	
Ipil-ipil	Leucaena leucocephala	3	50.0	-	-	3	9.3
Molave	Vitex parviflora	2	33.3	15	57.7	17	53.1
Acacia	Samanea saman	1	16.7	-	-	1	3.1
Lauan	Shorea ssp.	-	-	2	7.7	2	6.2
Yakal	Shorea malibato	-	-	2	7.7	2	6.2
Anislag	Securinega flexuaosa	-	-	3	11.5	3	9.4
Dalingdingan	Hopea acuminata	-	-	3	11.5	3	9.4
Jackfruit	Artocarpus heterophylla	-	-	1	3.8	1	3.1
Furniture:							
Chair		(n=16)		(n=39)		N=55)	
Acacia	Samanea saman	10	62.5	-	-	10	18.2
Bamboo	Bambusa ssp.	3	18.8	-	-	3	5.4
Coconut	Cocos nucifera	2	12.5	-	-	2	3.6
Bangkal	Nauclea orientales	1	6.2	-	-	1	1.8
Lauan	Shorea spp.	-	-	18	46.2	18	32.7
Narra	Pterocarpus indicus	-	-	9	23.1	9	16.4
Molave	Vitex parviflora	1	6.2	5	12.8	6	10.9
Toog	Combretodendron quadrialatum	-	-	1	2.6	1	1.8
Guisok	Shorea gisok	-	-	1	2.6	1	1.8
Dao	Dracontamelon dao	-	-	1	2.6	1	1.8
Antipolo	Artocarpus blancoi	-	-	3	7.7	3	5.4

* Multiple response

Table A10. (Continued)

Common/Local Names	Scientific Names	Critically Denuded (n=50) P	Critically Denuded (n=50) NP	Partially Denuded (n=50) P	Partially Denuded (n=50) NP	Total (N=100) P	Total (N=100) NP
Anislag	Securinega flexuaosa	-	-	1	2.6	1	1.8
Rattan	Calamus spp.	-	-	1	2.6	1	1.8
Furniture:							
Table							
Lauan	Shorea ssp.	3	30.0	10	29.4	13	29.5
Ipil-ipil	Leucaena leucocephala	3	30.0	-	-	3	6.8
Narra	Pterocarpus indicus	1	10.0	14	41.2	15	34.1
Antipolo	Artocarpus blancoi	-	-	3	8.8	3	6.8
Molave	Vitex parviflora	1	10.0	4	11.8	5	11.4
Binunga	Macaranga tanarius	1	-	1	2.9	1	2.3
Yakal	Shorea malibato	-	-	1	2.9	1	2.3
Acacia	Samanea saman	1	10.0	-	-	1	2.3
Bagalunga	Melia dubia	1	10.0	-	-	1	2.3
Guisok	Shorea gisok	1	10.0	-	-	1	2.3
Bamboo	Bambusa spp.	1	10.0	1	2.9	2	4.5

Table A10. (Continued)

Common/Local Names	Scientific Names	Critically Denuded (n=50) P	Critically Denuded (n=50) NP	Partially Denuded (n=50) P	Partially Denuded (n=50) NP	Total (N=100) P	Total (N=100) NP
Household tools/utensils:							
Chopping board		(n=36)		(n=34)		(N=70)	
Guisok	Shorea gisok	2	5.6	7	20.6	9	12.8
Narra	Pterocarpus indicus	1	2.8	9	26.5	10	14.3
Molave	Vitex parviflora	8	22.2	12	35.3	20	28.6
Lauan	Shorea spp.	3	8.3	3	8.8	6	8.6
Toog	Combrotodendron quadrialatum	1	2.8	1	2.9	1	1.4
Dao	Dracontamelon dao	-	-	1	2.9	1	1.4
Jackfruit	Artocarpus heterophylla	-	-	1	2.9	1	1.4
Ipil-ipil	Leucaena leucocephala	11	30.6	-	-	11	15.7
Kamachile	Pithecellobium dulce	1	2.8	-	-	1	1.4
Yakal	Shorea malibato	1	2.8	-	-	1	1.4
Acacia	Samanea saman	9	25.0	-	-	9	12.8
Sampalok	Tamarindus indica	-	-	1	2.9	1	1.4
Laddle		(n=11)		(n=12)		(N=23)	
Bamboo	Bambusa spp.	11	100.0	12	100.0	23	100.0

* Multiple response

Table A10. (Continued)

Common/Local Names	Scientific Names	Critically Denuded (n=50) P	Critically Denuded (n=50) NP	Partially Denuded (n=50) P	Partially Denuded (n=50) NP	Total (N=100) P	Total (N=100) NP
Household tools/utensils:							
Mortar		(n=32)		(n=15)		(N=47)	
Acacia	Samanea saman	21	65.6	-	-	21	44.7
Kamachile	Pithecellobium dulce	8	25.0	-	-	8	17.0
Dao	Dracontamelon dao	1	3.1	-	-	1	2.2
Jackfruit	Artocarpus heterophylla	1	3.1	-	-	1	2.2
Narra	Pterocarpus indicus	-	-	3	20.0	3	6.4
Guisok	Shorea gisok	-	-	2	13.3	2	4.2
Molave	Vitex parviflora	1	3.1	5	33.3	6	12.8
Antipolo	Artocarpus blancoi	-	-	3	20.0	3	6.4
Tindalo	Pahudia rhomboidea	-	-	2	13.3	2	4.2
Pestle		(n=32)		(n=15)		(N=47)	
Ipil-ipil	Leucaena leucocephala	32	100.0	2	13.3	34	72.3
Guisok	Shorea gisok	-	-	2	13.3	2	4.2
Lauan	Shorea spp.	-	-	2	13.3	2	4.2
Jackfruit	Artocarpus heterophylla	-	-	1	6.7	1	2.1
Toog	Combretodendron quadrialatum	-	-	1	6.7	1	2.1
Molave	Vitex parviflora	-	-	6	40.0	6	12.8
Tindalo	Pahudia rhomboidea	-	-	1	6.7	1	2.1

* Multiple response

Table A10. (Continued)

Common/Local Names	Scientific Names	Critically Denuded (n=50) P	Critically Denuded (n=50) NP	Partially Denuded (n=50) P	Partially Denuded (n=50) NP	Total (N=100) P	Total (N=100) NP
Household tools/utensils:							
Coconut grater		(n=18)		(n=23)		(N=41)	
Molave	Vitex parviflora	-	-	4	17.4	4	9.8
Lauan	Shorea spp.	5	27.8	4	17.4	9	22.0
Malubago	Abutilon indicus	-	-	3	13.0	3	7.3
Alagasi	Leucosyke capitellata	-	-	2	8.7	2	4.9
Jackfruit	Artocarpus heterophylla	1	5.6	2	8.7	3	7.3
Guisok	Shorea gisok	-	-	2	8.7	2	4.9
Binunga	Macaranga tanarius	1	5.6	2	8.7	3	7.3
Narra	Pterocarpus indicus	-	-	1	4.3	1	2.4
Antipolo	Artocarpus blancoi	-	-	1	4.3	1	2.4
Ipil-ipil	Leucaena leucocephala	2	11.1	-	-	2	4.9
Acacia	Samanea saman	7	38.9	-	-	7	17.1
Coconut	Cocos nucifera	2	11.1	-	-	2	4.9
Toog	Combretodendron quadrialatum	-	-	1	4.3	1	2.4
Anislag	Securinega flexuasa	-	-	1	4.3	1	2.4
Ganta		(n=6)		(n=2)		(N=8)	
Acacia	Samanea saman	3	50.0	-	-	3	37.5
Lauan	Shorea spp.	3	50.0	2	100.0	5	62.5
Bangkal	Nauclea orientales	1	16.7	-	-	1	12.5

* Multiple response

Table A10. (Continued)

Common/Local Names	Scientific Names	Critically Denuded (n=50) P	Critically Denuded (n=50) NP	Partially Denuded (n=50) P	Partially Denuded (n=50) NP	Total (N=100) P	Total (N=100) NP
Household tools/utensils:							
Corn sheller		(n=13)		(n=1)		N=14)	
Acacia	Samanea saman	3	23.1	-	-	3	21.4
Molave	Vitex parviflora	3	23.1	-	-	3	21.4
Lauan	Shorea ssp.	2	15.4	-	-	2	14.3
Ipil-ipil	Leucaena leucocephala	3	23.1	-	-	3	21.4
Jackfruit	Artocarpus heterophylla	1	7.7	-	-	1	7.1
Toog	Combretodendron quadrialatum	1	7.7	-	-	1	7.1
Malubago	Abutilon indicus	-	-	1	00.0	1	7.1
Corn Grinder		(n=4)		(n=1)		(N=5)	
Ipil-ipil	Samanea saman	-	-	1	100.0	1	20.0
Acacia	Samanea saman	4	100.0	-	-	4	80.0
Winnowing basket		(n=4)		(n=6)		(N=10)	
Bamboo	Bambusa ssp.	4	100.0	6	100.0	10	100.0

* Multiple response

Table A10. (Continued)

Common/Local Names	Scientific Names	Critically Denuded (n=50) P	Critically Denuded (n=50) NP	Partially Denuded (n=50) P	Partially Denuded (n=50) NP	Total (N=100) P	Total (N=100) NP
Tool Handle:							
Chisel		(n=4)		(n=4)		(N=8)	
Binunga	Macaranga tanarius	2	50.0	-	-	2	25.0
Ipil-ipil	Leucaena leucocephala	1	25.0	-	-	1	12.5
Molave	Vitex parviflora	1	25.0	1	25.0	2	25.0
Guisok	Shorea gisok	-	-	1	25.0	1	12.5
Jackfruit	Artocarpus heterophylla	-	-	1	25.0	1	12.5
Guava	Psidium guajava	-	-	1	25.0	1	12.5
Hammer		(n=2)		(n=4)		(N=6)	
Ipil-ipil	Leucaena leucocephala	1	50.0	-	-	1	16.7
Guisok	Shorea gisok	-	-	3	75.0	3	50.0
Molave	Vitex parviflora	1	50.0	1	25.0	2	33.3

* Multiple response

Table A10. (Continued)

Common/Local Names	Scientific Names	Critically Denuded (n=50) P	Critically Denuded (n=50) NP	Partially Denuded (n=50) P	Partially Denuded (n=50) NP	Total (N=100) P	Total (N=100) NP
Farm Implements:							
Bolo		(n=50)		(n=50)		(N=100)	
Binunga	Macaranga tanarius	26	52.0	13	26.0	39	39.0
Jackfruit	Artocarpus heterophylla	10	20.0	17	34.0	27	27.0
Lauan	Shorea spp.	-	-	3	6.0	3	3.0
Ipil-ipil	Leucaena leucocephala	7	14.0	-	-	7	7.0
Acacia	Samanea saman	1	2.0	-	-	1	1.0
Santol	Sandoricum koetjape	2	4.0	-	-	2	2.0
Breadfruit	Artocarpus altilis	1	2.0	-	-	1	1.0
Guava	Psidium guajava	6	12.0	3	6.0	9	9.0
Avocado	Persea americana	-	-	2	4.0	2	2.0
Malobago	Abutilon indicus	-	-	6	12.0	6	6.0
Yakal	Shorea malibato	-	-	3	6.0	3	3.0
Narra	Pterocarpus indicus	-	-	19	38.0	19	19.0
Lagnob	Ficus septica	-	-	1	2.0	1	1.0
Antipolo	Artocarpus blancoi	-	-	1	2.0	1	1.0
Toog	Combretodendron quadrialatum	-	-	1	2.0	1	1.0
Tindalo	Pahudia rhomboidea	-	-	1	2.0	1	1.0
Pick mattock		(n=5)		(n=1)		(N=6)	
Guisok	Shorea gisok	3	60.0	-	-	3	50.0
Ipil-ipil	Leucaena leucocephala	1	20.0	-	-	1	16.7

* Multiple response

Table A10. (Continued)

Common/Local Names	Scientific Names	Critically Denuded (n=50) P	Critically Denuded (n=50) NP	Partially Denuded (n=50) P	Partially Denuded (n=50) NP	Total (N=100) P	Total (N=100) NP
Iba(kamias)	Averrhoa bilimbi	1	20.0	-	-	1	16.7
Jackfruit	Artocarpus heterophylla	-	-	1	100.0	1	16.7
Farm Implements:							
Ax		(n=6)		(n=18)		(N=24)	
Guava	Psidium guajava	4	66.7	3	17.6	7	30.4
Ipil-ipil	Leucaena leucocephala	2	33.3	-	-	2	8.7
Molave	Vitex parviflora	-	-	1	5.9	1	4.3
Guisok	Shorea gisok	-	-	2	11.8	2	8.7
Yakal	Shorea malibato	-	-	2	11.8	2	8.7
Pugahan	Caryota cumingli	-	-	5	29.4	5	21.7
Narra	Pterocarpus indicus	-	-	2	11.8	2	8.7
Pomelo	Citrus grandis	-	-	1	5.9	1	4.3
Dalingdingan	Hopea acuminata	-	-	2	11.8	2	8.7
Shovel		(n=3)		(n=1)		(N=4)	
Guava	Psidium guajava	2	66.7	-	-	2	50.0
Ipil-ipil	Leucaena leucocephala	1	33.3	-	-	1	25.0
Jackfruit	Artocarpus heterophylla	-	-	1	100.0	1	25.0

* Multiple response

Table A10. (Continued)

Common/Local Names	Scientific Names	Critically Denuded (n=50) P	Critically Denuded (n=50) NP	Partially Denuded (n=50) P	Partially Denuded (n=50) NP	Total (N=100) P	Total (N=100) NP
Farm Implements:							
Yoke		(n=30)		(N=41)		(n=11)	
Ipil-ipil	Leucaena leucocephala	24	80.0	-	-	24	58.5
Molave	Vitex parviflora	1	3.3	3	27.3	4	9.8
Narra	Pterocarpus indicus	-	-	2	18.2	2	4.9
Acacia	Samanea saman	5	16.7	-	-	5	12.2
Jackfruit	Artocapus heterophylla	-	-	1	9.1	1	2.4
Yakal	Shorea malibato	-	-	3	27.3	3	7.3
Guava	Psidium guajava	-	-	1	9.1	1	2.4
Binunga	Macaranga tanarius	-	-	1	9.1	1	2.4
Plow		(n=21)		(N=32)		(n=11)	
Ipil-ipil	Leucaena leucocephala	15	71.4	-	-	15	46.9
Molave	Vitex parviflora	11	52.4	7	63.6	18	56.2
Guisok	Shorea gisok	-	-	2	18.2	2	6.2
Yakal	Shorea malibato	-	-	1	9.1	1	3.1
Toog	Combretodendron quadrialatum	-	-	1	9.1	1	3.1

* Multiple response

Table A10. (Continued)

Common/Local Names	Scientific Names	Critically Denuded (n=50) P	Critically Denuded (n=50) NP	Partially Denuded (n=50) P	Partially Denuded (n=50) NP	Total (N=100) P	Total (N=100) NP
Farm Implements:							
Harrow		(n=19)		(n=10)		(N=29)	
Molave	Vitex parviflora	9	47.4	3	30.0	12	41.4
Ipil-ipil	Leucaena leucocephala	3	15.8	-	-	3	10.3
Guisok	Shorea gisok	7	36.8	3	30.0	10	34.5
Tindalo	Pahudia rhomboidea	2	10.5	-	-	2	6.9
Toog	Combretodendron quadrilatum	-	-	2	20.0	2	6.9
Yakal	Shorea malibato	-	-	1	10.0	1	3.4
Jackfruit	Artocarpus heterophylla	-	-	1	10.0	1	3.4
Narra	Pterocarpus indicus	-	-	1	10.0	1	3.4
Abaca stripper		(n=0)		(n=2)		(N=2)	
Guisok	Shorea gisok	-	-	1	50.0	1	50.0
Yakal	Shorea malibato	-	-	1	50.0	1	50.0
Narra	Pterocarpus indicus	-	-	1	50.0	1	50.0
Seed container		(n=7)		(n=0)		(N=7)	
Bamboo	Bambusa ssp.	7	100.0	-	-	7	100.0

* Multiple response

Table A11. Preferred tree species for various uses *

Common/Local Names	Scientific Names	Critically Denuded (n=50) P	Critically Denuded (n=50) NP	Partially Denuded (n=50) P	Partially Denuded (n=50) NP	Total (N=100) P	Total (N=100) NP
Fuel							
Ipil-ipil	Leucaena leucocephala	48	96.0	18	36.0	66	66.0
Molave	Vitex parviflora	3	6.0	11	22.0	14	14.0
Binunga	Macaranga tanarius	3	6.0	3	6.0	6	6.0
Acacia	Samanea saman	2	4.0	-	-	2	2.0
Lauan	Shorea spp.	-	-	3	6.0	3	3.0
Guisok	Shorea gisok	-	-	3	6.0	3	3.0
Sudiang	Ctenolophon philippinensis	-	-	1	2.0	1	1.0
Narra	Pterocarpus indicus	-	-	16	32.0	16	16.0
Santol	Sandoricum koetjape	-	-	3	6.0	3	3.0
Alagasi	Leucosyke capitellata	-	-	2	4.0	2	2.0
Malubago	Abutilon indicus	-	-	1	2.0	1	1.0
Caimito	Chrysophyllum caimito	-	-	2	4.0	2	2.0
Anislag	Securinega flexuaosa	-	-	1	2.0	1	1.0
Guava	Psidium guajava	-	-	1	2.0	1	1.0
Soil Improver							
Ipil-ipil	Leucaena leucocephala	48	96.0	44	88.0	92	92.0
Madre de cacao	Gliricidia sepium	-	4.0	18	36.0	20	20.0
Nothing specific		1	2.0	3	6.0	4	4.0

*Multiple response

Table A11. (Continued)

Common/Local Names	Scientific Names	Critically Denuded (n=50) P	Critically Denuded (n=50) NP	Partially Denuded (n=50) P	Partially Denuded (n=50) NP	Total (N=100) P	Total (N=100) NP
Post							
Molave	Vitex parviflora	43	86.0	46	92.0	89	89.0
Ipil-ipil	Leucaena leucocephala	14	28.0	-	-	14	14.0
Toog	Combretodendron quadrialatum	5	10.0	-	-	5	5.0
Madre de cacao	Gliricidia sepium	2	4.0	-	-	2	2.0
Jackfruit	Artocarpus heterophylla	2	4.0	-	-	2	2.0
Anislag	Securinega flexuaosa	1	2.0	1	2.0	2	2.0
Lauan	Shorea spp.	7	14.0	2	4.0	9	9.0
Guisok	Shorea gisok	3	6.0	8	16.0	11	11.0
Caimito	Chrysophyllum caimito	3	6.0	-	-	3	3.0
Acasia	Samanea saman	2	4.0	-	-	2	2.0
Yakal	Shorea malibato	2	4.0	4	8.0	6	6.0
Tindalo	Pahudia rhomboidea	-	-	4	8.0	4	4.0
Narra	Pterocarpus indicus	-	-	2	4.0	2	2.0
Daling-dingan	Hopea acuminata	-	-	8	16.0	8	8.0
Construction							
Material							
Molave	Vitex parviflora	27	54.0	17	34.0	44	44.0
Toog	Combretodendron quadrialatum	12	24.0	5	10.0	17	17.0
Lauan	Shorea ssp.	11	22.0	32	64.0	43	43.0
Guisok	Shorea gisok	2	4.0	13	26.0	15	15.0
Apitong	Dipterocarpus grandiflorus	-	-	1	2.0	1	1.0

* Multiple response

Table A11. (Continued)

Common/Local Names	Scientific Names	Critically Denuded (n=50) P	Critically Denuded (n=50) NP	Partially Denuded (n=50) P	Partially Denuded (n=50) NP	Total (N=100) P	Total (N=100) NP
Nato	Palaquium luzoniense	-	-	1	2.0	1	1.0
Anislag	Securinega flexuosa	3	6.0	1	2.0	4	4.0
Tindalo	Pahudia rhomboidea	2	4.0	4	8.0	6	6.0
Yakal	Sorea malibato	2	4.0	4	8.0	6	6.0
Antipolo	Artocarpus blancoi	-	-	3	6.0	3	3.0
Bangkal	Nauclea orientales	1	2.0	1	2.0	2	2.0
Narra	Pterocarpus indicus	-	-	16	32.0	16	16.0
Dalingdingan	Hopea acuminata	-	-	3	6.0	3	3.0
Balubo	Diplodiscus paniculatus	-	-	1	2.0	1	1.0
Binunga	Macaranga tanarius	8	16.0	-	-	8	8.0
Ipil-ipil	Leucaena leucocephala	5	10.0	-	-	5	5.0
Madre de cacao	Gliricidia sepium	1	2.0	-	-	1	1.0
Guijo	Shorea guiso	-	-	1	2.0	1	1.0
Bamboo	Bambusa spp.	9	18.0	-	-	9	9.0
Coconut	Cocos nucifera	13	26.0	7	14.0	20	20.0
Food							
Jackfruit	Artocarpus heterophylla	32	64.0	26	52.0	58	58.0
Mango	Mangifera indica	19	38.0	10	20.0	29	29.0
Star apple	Chrysophyllum caimito	16	32.0	15	30.0	31	31.0
Banana	Musa sapientum	10	20.0	9	18.0	19	19.0
Mabolo	Diospyros philippinensis	-	-	1	2.0	1	1.0
Avocado	Persea americana	4	8.0	6	12.0	10	10.0
Guava	Psidium guajava	3	6.0	4	8.0	7	7.0

* Multiple response

Table A11. (Continued)

Common/Local Names	Scientific Names	Critically Denuded (n=50) P	Critically Denuded (n=50) NP	Partially Denuded (n=50) P	Partially Denuded (n=50) NP	Total (N=100) P	Total (N=100) NP
Santol	Sandoricum koetjape	-	-	1	2.0	1	1.0
Papaya	Carica papaya	1	2.0	3	6.0	4	4.0
Guyabano	Annona muricata	-	-	1	2.0	1	1.0
Lanzones	Lansium dometicum	-	-	4	8.0	4	4.0
Pomelo	Citrus grandis	-	-	1	2.0	1	1.0
Rambutan	Nephelium lappaceum	1	2.0	-	-	1	1.0
Any fruit tree		6	12.0	-	-	6	6.0
Craft							
Lauan	Shorea spp.	-	-	16	32.0	16	16.0
Narra	Pterocarpus indicus	-	-	33	66.0	33	33.0
Guisok	Shorea gisok	-	-	4	8.0	4	4.0
Molave	Vitex parviflora	-	-	12	24.0	12	12.0
Anislag	Securinega flexuosa	-	-	1	2.0	1	1.0
Ipil-ipil	Leucaena leucocephala	-	-	1	2.0	1	1.0
Rattan	Calamus spp.	-	-	1	2.0	1	1.0
Fodder							
Ipil-ipil	Leucaena leucocephala	46	92.0	23	46.0	69	69.0
Bogang		2	4.0	-	-	2	2.0
No idea		2	4.0	2	4.0	2	2.0

*Multiple response

Table A12. Preferred characteristics of tree species for various uses*

Uses	Preferred Characteristics	Critically Denuded (n=50) n	%	Partially Denuded (n=50) n	%	Total (N=100) N	%
Fuel	Easily combustible	46	92.0	45	90.0	91	91.0
	Long lasting embers	23	46.0	20	40.0	43	43.0
	Little ash	2	4.0	6	12.0	3	3.0
	Nothing specific	-	-	3	6.0	3	3.0
Post	Strong/durable	45	90.0	39	78.0	84	84.0
	Resistant to decay	20	40.0	30	60.0	50	50.0
	Resistant to wood destroying insect	3	6.0	3	6.0	6	6.0
	Nothing specific	-	-	2	4.0	2	2.0
Construction Material							
	Strong/durable	42	84.0	41	82.0	83	83.0
	Resistant to wood-destroying insects	29	58.0	16	32.0	45	45.0
	Straight stem form	5	10.0	1	2.0	6	6.0
	Resistant to decay	-	-	9	18.0	9	9.0
	Nothing specific	-	-	2	4.0	2	2.0
Fodder	Nutritious	11	22.0	2	4.0	13	13.0
	Palatable	4	8.0	6	12.0	10	10.0
	Medicinal	-	-	5	10.0	5	5.0
	Fast growth	-	-	2	4.0	2	2.0
	Nothing specific	35	70.0	35	70.0	70	70.0

* Multiple response

Table A12. (Continued)

Uses	Preferred Characteristics	Critically Denuded (n=50) n	%	Partially Denuded (n=50) n	%	Total (N=100) N	%
Food	Palatable/delicious	27	54.0	36	72.0	63	63.0
	Nutritious	18	36.0	14	28.0	32	32.0
	Bear plenty of fruits	9	18.0	8	16.0	17	17.0
	Nothing specific	2	4.0	5	10.0	7	7.0
Craft	Durable/strong/hard	-	-	28	56.0	28	28.0
	Easily formed	-	-	2	4.0	2	2.0
	Smooth texture	-	-	32	64.0	32	32.0
	Nice color/reddish	-	-	4	8.0	4	4.0
	Nothing specific	-	-	7	14.0	7	7.0
Soil Improver							
	Effective in restoring soil fertility	22	44.0	25	50.0	47	47.0
	Thick foliage	20	40.0	14	28.0	34	34.0
	Leaves easily decomposed	-	-	12	24.0	12	12.0
	Nothing specific	8	16.0	3	6.0	11	11.0

* Multiple respon