FOREST AND LAND-USE PRACTICES IN PHILIPPINE UPLANDS: NATIONAL LEVEL ANALYSIS BASED ON EIGHT VILLAGES

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FOREST AND LAND-USE PRACTICES IN PHILIPPINE UPLANDS: NATIONAL LEVEL ANALYSIS BASED ON EIGHT VILLAGES*

*Marian S. delos Angeles and Lota A. Ygrubay***

I. INTRODUCTION

The Forest/Land-use Practices in the Philippines Study (FLUPPS) investigates forest and land-use practices of the rural poor across various sites. It focuses on the potential relationships between forest, tree-use patterns and land-use practices taking into account:

a. forest-related policies and development programs in the national level;
b. social, economic and tenurial characteristics of households; and
c. conditions specific to the communities studied.

Four investigators gathered information on the household-level through surveys on (1) social and economic conditions of 50 respondents in each eight study sites; (2) forest and tree-use practices of 25 households in each of the same sites; and (3) case analysis of village-specific issues. Additional information on fuelwood use was generated in six of the eight villages.

Two sets of analyses were conducted in the FLUPPS project. The first interprets pooled data sets on the 400 households from the eight villages (Figure 1) surveyed in 1989. The second supplements in-

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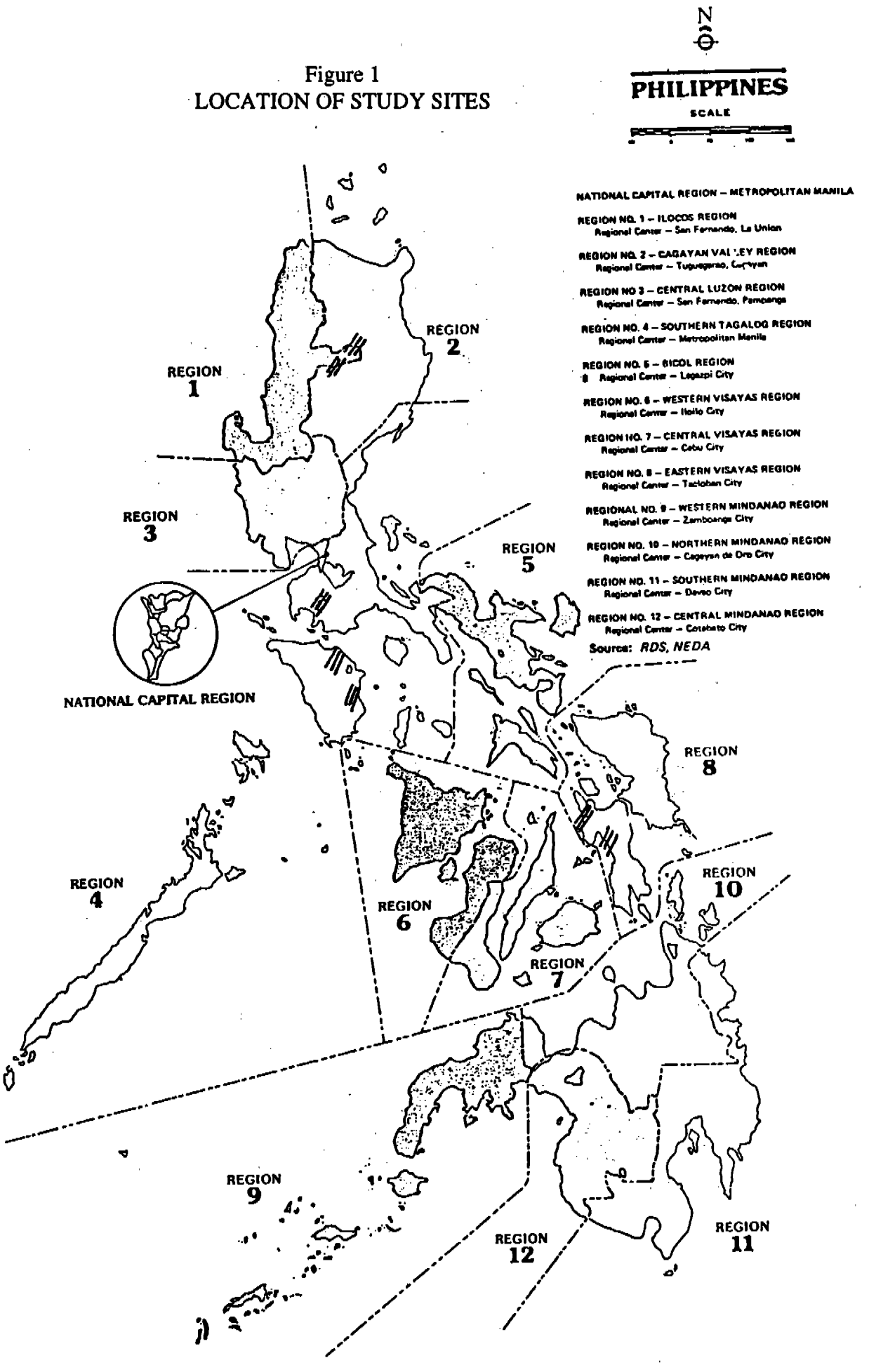
*Final report submitted to the Ford Foundation.

This study is part of a regionwide effort to develop a common data base on various sites and agro-ecological zones in several countries. The regional study is coordinated by the Forestry/Forestry Research and Development Project (F/FRED) of the Winrock International Institute for Agricultural Development and is funded by the United States Agency for International Development (USAID).

This particular study includes case studies and household surveys funded through the F/FRED small grants program. The PIDS coordinated and implemented the national-level analysis while the Ford Foundation funded this study.

**Research Fellow and Senior Research Specialist, respectively, Philippine Institute for Development Studies. Support from Pilipinas Felix, Research Analyst II; Crescencio Jovellanos, EDP Specialist; Erwin Tamayo, Programmer; and Susan Pizarro, Executive Assistant, are gratefully acknowledged.

Figure 1
LOCATION OF STUDY SITES



formation on certain economic variables on fuelwood-use patterns in six of the eight villages. Individual reports on the village case studies are reported in the regional studies of Forestry/Forestry Research and Development Project (F/FRED).

A. *Background*

The Philippines has a total land area of 300,000 square kilometers, 45 percent of which have at least 18 percent slope. As of 1988, the population was estimated at 58.7 million. About 42 percent resides in the rural areas at combined linear and cluster settlement patterns along roads and coastlines.

The labor force comprises 30 percent of the country's population, or 23.4 million people in 1988. Forty-two percent of the labor force were in agriculture. Dependency rate in both rural and urban areas was 69 children per 100 economically active persons including the elderly, the rate of which is 75 per 100 persons in the 15-64 age bracket.

Migration patterns are of two types: (1) rural to urban areas, with the National Capital (Metro Manila) and Southern Tagalog Regions as major receiving areas; and (2) intra-rural migration with the uplands and coastlines as major destinations. In general, the largest positive net migration to the uplands occurred in low density regions, such as in Southern and Northern Mindanao and the Ilocos Region, where upland intra-regional migration is prevalent.

The upland population in 1988 was estimated at 17.8 million people, implying a density of 119 persons per square kilometer, a substantial 61 percent increase from 74 persons per square kilometer in 1970 (M.C.J. Cruz *et al.* 1988).

The country's forest lands which comprise some 50 percent of the total land area are public domain. Thus, neither private nor collective ownership of trees in forests, or of forest lands is feasible under the Philippine Constitution. Access to upland resources has been governed by a system of rights and restrictions granted by the state on specific uses such as timber harvesting and minor forest products gathering, for a maximum of 50 years.

Decreasing forest cover and increasing upland population pressure are solved mostly by contract reforestation and the Integrated Social Forestry Program (ISFP). The government helps develop forests by providing technical assistance and planting materials, constructing physical infrastructure support and organizing community-based groups. While this is a significant departure from traditional forestry concerns of timber production that was predominantly large-scale, the complexity and magnitude of upland resources management warrant continuing focus on upland poverty and population pressure on forest resources.

B. *Rationale*

The study identifies the rural poor and measures their needs and capabilities. It focuses on the tree products from forests and upland cultivation systems.

Earlier studies by M.C.J. Cruz *et al.* (1988) on upland population and migration patterns show that official data on upland communities grossly underestimated population pressure on the uplands and

the Philippine forests. With virtually open access to public forest lands, shifting cultivation and indiscriminate use of lowland agricultural systems hastened the conversion of forest lands into agricultural crop production areas.

Uncontrolled gathering of forest and tree products such as lumber and fuelwood further depleted the forests. On the other hand, the implementation of upland development projects under an improved system of access rights which encourages the establishment of agroforestry systems, may be expected to reverse the deforestation process in the medium and long term period.

This study analyzes the forest and land use practices of the upland poor through the development of a common database. It also examines the influence of household-specific characteristics, development intervention mechanisms, institutional and local use conditions on specific tree and forest-use practices.

II. CONCEPTUAL FRAMEWORK

In analyzing the determinants of tree-use and forest, land-use patterns, the following relationship may be investigated:

Practice (i,j,k) = f (household socioeconomic characteristics, community level characteristics, outside intervention, etc.)

where i = a specific practice;
j = the household as the observation unit; and
k = the level of aggregation in which the analysis is conducted;
the smallest level of which is usually the study site

This relationship explains variation in tree-use or forest, land-use across households in terms of the three sets of independent variables : (1) household-specific characteristics; (2) community-level differences; and (3) site-specific details of interventions, policies, etc.

Focusing on household-level variation gives project implementors a set of characteristics that helps identify early adoptors, average adoptors and unlikely adoptors of suggested changes in tree production and use systems. This process, in turn, would help project managers determine the success of the project at the household level. Examples of household-level variation are age, educational attainment, and size, among others.

The second set of factors that influences household behavior are community level characteristics, such as the degree of cohesiveness, prevailing institutional arrangements, poverty incidence, infrastructure, and the like. These factors influence the design of development mechanisms as well as the performance measures set by project managers.

Another set of factors hypothesizes that differences across sites significantly determine variation in tree and/or forest, land-use practices. Differences accros site are attributed to site variations as well as the general conditions in which the household operates. These differences should be treated as

"givens" of the project. Again, the project design would vary according to such "givens," assuming the latter is not likely to change within a reasonable period of time. Examples of site-specific characteristics include rainfall, topography, soil characteristics, and the like.

III. EMPIRICAL FINDINGS

A. *Comparison of Village-Level Conditions*

The eight villages are first compared in terms of selected social indicators as presented in Table 1. In terms of **household size**, Guinzadan, Mountain Province has the biggest average size of 8.4, while the two Mindoro sites have sizes lower than the national average of 5.8. These three villages are composed of cultural minority communities.

Educational levels range from illiterate majority in Banilad, Mindoro (72% of household heads and 31% of spouses) to higher human resource development levels in Guinzadan, Mountain Province (38% with primary among household heads and 14% of spouses with primary or with college education). The other six villages tend to exhibit similar patterns of educational levels.

Households were grouped into low, medium and high *income categories* through the use of wealth indicators developed by various researchers for their respective community settings. Banilad, Mindoro and the two Laguna communities are comprised mostly of poor households (at least 80% share of households surveyed). On the other hand, at least 58 percent of households in Guinzadan, Paitan and San Isidro belong to the middle class.

In terms of *absolute incomes*, Table 2 indicates that households in the villages of Mountain Province (with average cash earnings of P9,371 and P20,835) and San Isidro, Leyte (P15,686 average cash income) are better off than the average cash income of all eight communities of P7,673. Such earnings do not mainly come from tree products since the highest proportion of income from tree products is only four percent in these three villages.

On the dependence of poor communities and the informal sector on forest products, communities with incomes below the national poverty level obtain significant proportions of their income from tree products: Banilad, Mindoro (20%), Paitan, Mindoro (38%), Juan Santiago, Laguna (30%) and J.P. Laurel, Laguna (56%). As the case studies indicate, lumber production and fruit tree harvests are important activities in the Laguna areas while rattan gathering and manufacture of rattan-based products are important activities among the Mindoro households (Maligalig 1990 and Mallion *et al.* 1990).

In terms of *credit*, Guinzadan households receive higher amounts, on the average, from government, bank, and informal sources, while credit from cooperatives is the highest among Bila respondents. It should be noted, however, that the standard deviations of all credit variables are much higher than the averages for all sites, implying uneven access to the various credit sources.

On the average, households work on *farms with an area* of 1.64 hectares. The average area is highest in Mindoro at 3.17 hectares. The rest of the households in the six villages have very small farms

Table 1
SUMMARY STATISTICS, SELECTED SOCIAL INDICATORS I

	Philippines	Mountain Province		Mindoro		Leyte		Laguna	
		Bila	Guinzadan	Banilad	Paitan	San Isidro	San Miguel	J.P Laurel	Juan Santiago
Average Household Size	5.8	6.4	8.4	4.6	4.6	5.5	4.9	5.4	6.4
Ethnic Group Composition		94% Kankanai	98% Kankanai	84% Mangyan	94% Mangyan	100% Cebuano	100% Cebuano	82% Tagalog	78% Tagalog
Wealth Rank, Relative to Site	n.a.	50% Low	58% Medium	82% Low	68% Medium	72% Medium	76% Low	82% Low	90% Low
Percent of Household Heads in Dominant Educational Level	54% Primary	56% Primary	38% Primary	72% Illiterate	56% Primary	70% Illiterate	60% Primary	58% Primary	72% Primary
Percent of Spouses in in Dominant Educational Level	50% Primary	19% Primary	14% Primary; 14% College	31% Illiterate	26% Primary	32% Illiterate	31% Primary	31% Primary	34% Primary

Note : N.A. - not applicable
Source : 1989 Forest/Land-use Practices in the Philippines Study (FLUPPS) Survey.

Table 2
SUMMARY STATISTICS, SELECTED SOCIAL INDICATORS II

	Philippines	Mountain Province		Mindoro		Leyte		Laguna	
Variable */		Bila	Guinzadan	Banilad	Paitan	San Isidro	San Miguel	J.P Laurel	Juan Santiago
Total Cash Earnings (in pesos)	7,673	9,371	20,835	2,824	5,651	15,686	5,512	741	765
	(11,673)	(14,292)	(15,996)	(3,090)	(6,048)	(14,285)	(4,704)	(882)	(708)
Percent of Income from Tree Products	19	2	1	20	38	4	4	56	30
	(30)	(8)	(6)	(25)	(31)	(9)	(16)	(36)	(34)
Credit by Source for All Activities									
Government	56	0	360	0	0	93	3	0	0
	(600)	(-)	(1,481)	(-)	(-)	(908)	(23)	(-)	(-)
Bank	89	0	800	0	0	0	0	0	2
	(1,886)	(-)	(5,657)	(-)	(-)	(-)	(-)	(-)	(13)
Cooperative	118	920	120	0	0	1	1	0	20
	(1,187)	(3,434)	(594)	(-)	(-)	(6)	(7)	(-)	(129)
Informal Sector	451	666	2,572	0	155	265	111	39	63
	(3,104)	(2,950)	(8,494)	(-)	(722)	(627)	(704)	(110)	(195)
Total Area Farmed by Household	1.64	0.25	0.21	2.91	3.17	1.34	0.67	2.24	2.33
	(1.99)	(0.33)	(0.28)	(2.37)	(2.17)	(1.10)	(0.62)	(1.60)	(2.67)

Note: */ Entries represent Means while numbers in parentheses are Standard Deviations.
Source: 1989 Forest/Land-use Practices in the Philippines Study (FLUPPS) Survey.

which is typical of upland areas in the country (with an average size of area cultivated registered at 1.4 hectares in 1980).

Household heads devote some 40 to 60 percent of their time to agriculture in the Mountain Province, Leyte and Laguna villages, which is typical of Filipino rural household heads (Table 3). On the other hand, a lower 20-25 percent of time is spent by Mindoro household heads in agriculture. Similar differences between *time allocation* of spouses in the six areas vis-a-vis those in Mindoro exists with forest-products gathering as more prominent in Mindoro. In general, spouses spend little time for agriculture or wage labor in all sites.

Table 4 summarizes the results of chi-square tests that were conducted to determine differences among the eight village in terms of *wealth, forestry extension, tree rights, and access to forests.* As indicated by the earlier discussion, the communities studied differ in terms of relative ranking of household economic status (variable 1, Table 4).

The villages *differ* from each other in terms of their use of *tree seedling sources.* Sixty percent of households in Paitan, Mindoro use the forestry station as seed source, as do 34 percent of Banilad, Mindoro and 22 percent of Guinzadan, Mountain Province households (Table 6). The rest do not get seedlings from the forestry station at all. Similar trends are observed with respect to obtaining seeds from government nurseries, with 36 percent of Bila using such seed source (Table 7). Obtaining seeds from non-government organization (NGO) sources is done by six percent of the Paitan households (Table 8).

Tree ownership patterns do not vary across households in the eight sites, as indicated for variables 5 to 8 in Table 4. There is virtually no ownership of trees in common properties (Figure 2), nor for woody perennials in either owned or rented private properties. Tables 9 to 11 show that no one owns the trees in various property types as a result of Philippine constitutional limitations.

The villages differ in their access to various forest types (variables 9 to 13, Table 4). Access to common forests is prevalent among the Laguna and Mindoro areas while 50 percent of Bila households regulate access (Figure 3) to various forest types.

Regulated and seasonal access to fallows is prevalent among the Mountain Province communities. Fallows are used as common property in the Laguna and Mindoro villages while Leyte households do not have access to fallows (Figure 4). Similar patterns are also observed in terms of access to barren lands and village forests (Figures 5 and 6, respectively). In terms of access to state-owned forests, the Laguna villages have unrestricted use, the Mindoro communities, controlled use, and Leyte and Mountain Province areas, no access (Figure 7).

Since the eight villages vary considerably in terms of access to various forest types, it is expected that tree-use and forest land-use also differ among households.

B. *Relationships Between Forest/Land-Use Practices andSpecific Factors*

Tables 12 to 17 and Figures 8 to 28 are Philippine versions of the analysis conducted for the regional study by C. Mehl (1991). Information presented in Tables 12 to 15 shows the access to forestry

Table 3
MEANS (STANDARD DEVIATION), SELECTED TIME ALLOCATION INDICATORS

	Philippines	Mountain Province		Mindoro		Leyte		Laguna	
		Bila	Guinzadan	Banilad	Paitan	San Isidro	San Miguel	J.P Laurel	Juan Santiago
HEAD OF HOUSEHOLD									
% Time spent on : */									
Agriculture	43	51	55	20	25	49	63	41	41
	(32)	(33)	(38)	(16)	(15)	(35)	(28)	(32)	(30)
Agricultural Wage	11	9	8	6	6	12	10	18	18
	(20)	(18)	(20)	(12)	(18)	(18)	(13)	(24)	(26)
Industrial Wage	3	2	0	4	7	4	1	0	3
	(14)	(14)	(-)	(17)	(21)	(18)	(5)	(-)	(14)
SPOUSE									
% Time spent on: */									
Agricultural Wage	26	39	27	11	14	28	32	25	30
	(28)	(36)	(31)	(10)	(13)	(26)	(27)	(29)	(30)
Industrial Wage	3	5	3	0	1	5	1	3	2
	(10)	(18)	(12)	(3)	(5)	(15)	(5)	(8)	(8)

Note: */ Totals do not add up to 100% since other categories are not shown in this table.

Source: 1989 Forest/Land-use Practices in the Philippines Study (FLUPPS) Survey.

Table 4
TESTS FOR DIFFERENCE ACROSS COMMUNITIES

Variable	Degrees of Freedom (DF)	X^2	Probability	Conclusion
1. Village by wealth rank	14	107.663	0	reject Ho
2. Village by forestry station seedling source	7	166.771 *	0	reject Ho
3. Village by govt. nursery/seedling source	7	88.071	0	reject Ho
4. Village by NGO nursery seedling source	7	14.36	0.045	reject Ho
5. Village by trees on common property owned	21	21.159	0.449	accept Ho
6. Village by trees on private property owned	56	72.817	0.065	accept Ho
7. Village by other woody perennial on private property owned	77	74.736	0.552	accept Ho
8. Village by other woody perrenials on private property rented	7	7.018	0.427	accept Ho
9. Village by access to commons	28	695.739 *	0	reject Ho
10. Village by access to fallows	28	638.867	0	reject Ho
11. Village by access to barren lands	28	718.261	0	reject Ho
12. Village by access to village forests	14	731.859 *	0	reject Ho
13. Village by access to state forests	21	764.211	0	reject Ho

Notes: a) * means that the chi-square tests may be valid.
b) Ho: villages do not differ according to the proportions of households in various categories (of the variable indicated).

Source: 1989 Forest/Land-use Practices in the Philippines Study (FLUPPS) Survey.

Table 5
COMPARISON OF VILLAGE BY RELATIVE WEALTH RANK

Villages	Wealth Rank Low	Medium	High	Total
Bila, Mountain Prov.				
Frequency	25	21	4	50
% Share	50	42	8	100
Guinzadan, Mountain Prov.				
Frequency	19	29	2	50
% Share	38	58	4	100
San Miguel, Baybay Leyte				
Frequency	38	10	1	49
% Share	78	20	2	100
San Isidro, Baybay Leyte				
Frequency	8	36	6	50
% Share	16	72	12	100
J.P. Laurel, Laguna				
Frequency	41	6	3	50
% Share	82	12	6	100
Juan Santiago, Laguna				
Frequency	45	4	1	50
% Share	90	8	2	100
Paitan, Mindoro				
Frequency	34	16	0	50
% Share	68	32	0	100
Banilad, Mindoro				
Frequency	41	9	0	50
% Share	82	18	0	100
TOTAL	251	131	17	399
(%)	-63	-33	-4	-100

Source: 1989 Forest/Land-use Practices in the Philippines Study (FLUPPS) Survey.

Table 6
COMPARISON OF VILLAGES BY FORESTRY STATION SEEDLING/SEED SOURCE

Villages	Forestry Station Seed Source		Total
	don't use service	use service	
Bila, Mountain Prov.			
Frequency	50	0	50
% share	100	0	100
Guinzadan, Mountain Prov.			
Frequency	39	11	50
% share	78	22	100
San Miguel, Baybay Leyte			
Frequency	50	0	50
% share	100	0	100
San Isidro, Baybay Leyte			
Frequency	50	0	50
% share	100	0	100
J.P. Laurel, Laguna			
Frequency	50	0	50
% share	100	0	100
Juan Santiago, Laguna			
Frequency	50	0	50
% share	100	0	100
Paitan, Mindoro			
Frequency	20	30	50
% share	40	60	100
Banilad, Mindoro			
Frequency	33	17	50
% share	66	34	100
TOTAL, w/o Leyte	242	58	400
(%)	-81	-19	-100

Source: 1989 Forest/Land-use Practices in the Philippines Study (FLUPPS) Survey.

Table 7
COMPARISON OF VILLAGES BY GOVERNMENT NURSERY SEEDLING SEED SOURCE

Villages	Government Nursery Seed Source		
	don't use service	use service	Total
Bila, Mountain Prov.			
Frequency	32	18	50
% share	64	36	100
Guinzadan, Mountain Prov.			
Frequency	47	3	50
% share	94	6	100
San Miguel, Baybay, Leyte			
Frequency	50	0	50
% share	100	0	100
San Isidro, Baybay, Leyte			
Frequency	50	0	50
% share	100	0	100
J.P. Laurel, Laguna			
Frequency	45	5	50
% share	90	10	100
Juan Santiago, Laguna			
Frequency	50	0	50
% share	100	0	100
Paitan, Mindoro			
Frequency	50	0	50
% share	100	0	100
Banilad, Mindoro			
Frequency	46	4	50
% share	92	8	100
TOTAL	370	30	400
(%)	-93	-7	-100
TOTAL, w/o Leyte	270	30	300
(%)	-90	-10	-100

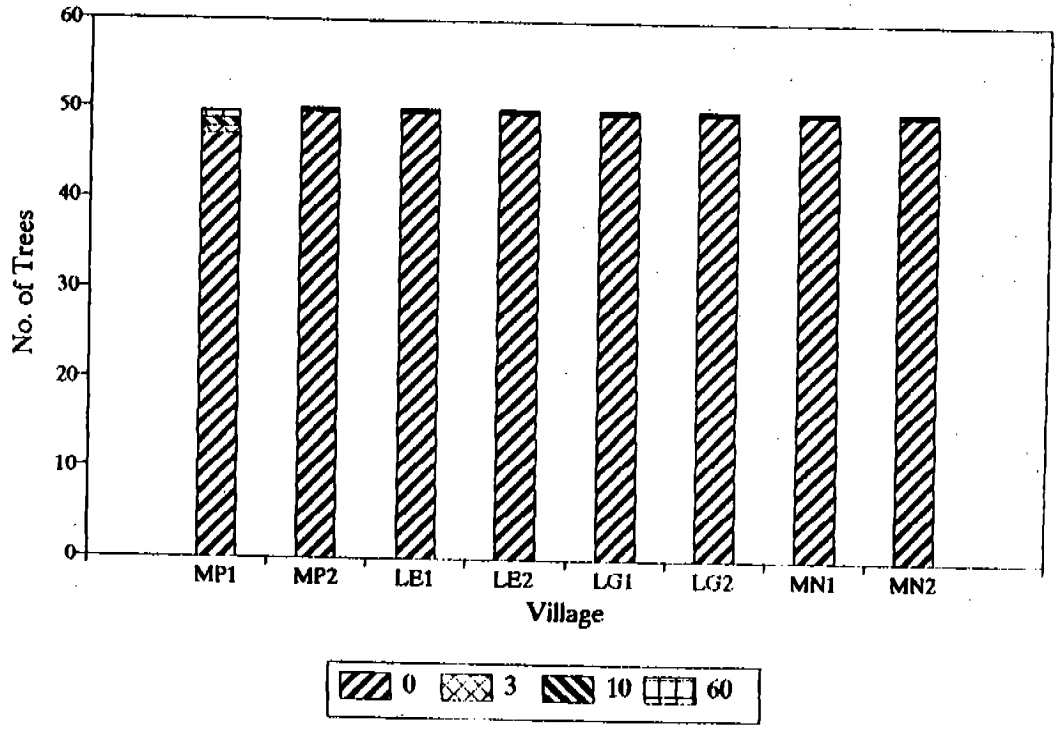
Source: 1989 Forest/Land-use Practices in the Philippines Study (FLUPPS) Survey.

Table 8
COMPARISON OF VILLAGES BY NGO NURSERY SEEDLING/SEED SOURCE

Villages	NGO Nursery Seed Source		Total
	don't use service	use service	
Bila, Mountain Prov.			
Frequency	50	0	50
% share	100	0	100
Guimaadan, Mountain Prov.			
Frequency	50	0	50
% share	100	0	100
San Miguel, Baybay, Leyte			
Frequency	49	1	50
% share	98	1	100
San Isidro, Baybay, Leyte			
Frequency	50	0	50
% share	100	0	100
J.P. Laurel, Laguna			
Frequency	50	0	50
% share	100	0	100
Juan Santiago, Laguna			
Frequency	50	0	50
% share	100	0	100
Paitan, Mindoro			
Frequency	47	3	50
% share	94	6	100
Banilad, Mindoro			
Frequency	49	1	50
% share	98	2	100
TOTAL	395	5	400
(%)	-99	-1	-100

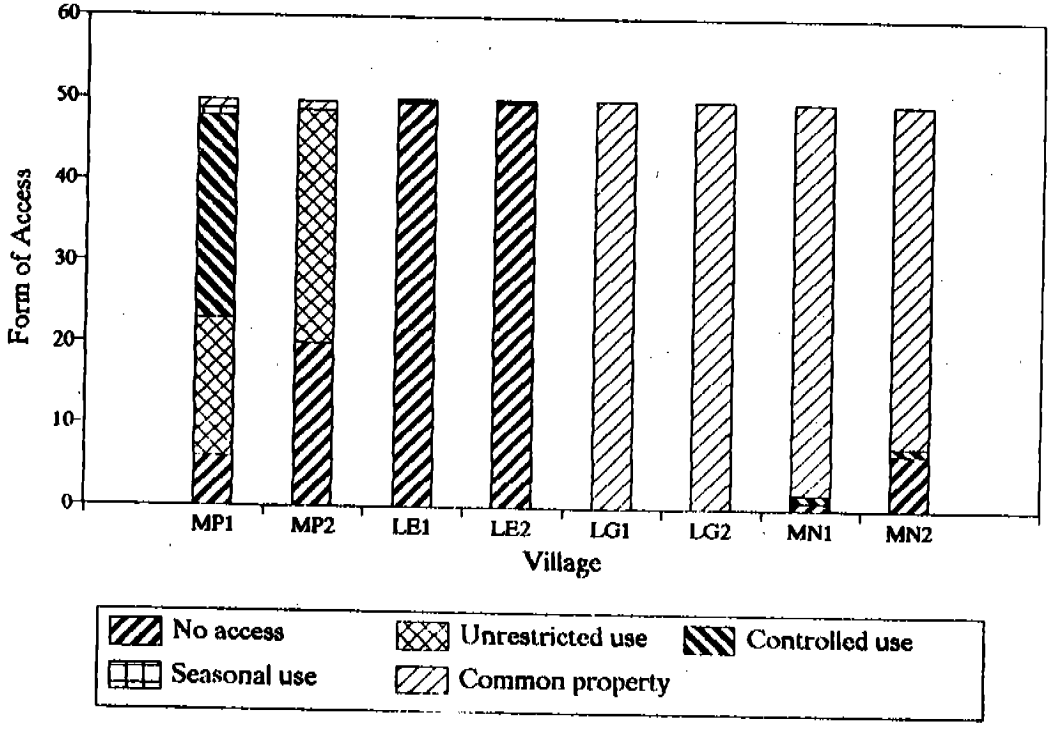
Source: 1989 Forest/Land-use Practices in the Philippines Study (FLUPPS) Survey.

Figure 2
COMPARISON OF VILLAGES BY TREES ON COMMON PROPERTY OWNED



Source: See Appendix 1.

Figure 3
COMPARISON OF VILLAGES BY ACCESS TO COMMONS



Source: See Appendix 2.

Table 9
COMPARISON OF VILLAGES BY TREES ON PRIVATE PROPERTY OWNED

Villages	0	1-10	11-50	more than 50	Total
Bila, Mountain Prov.					
Frequency	40	5	2	1	50
% share	80	10	4	2	100
Guinzadan, Mountain Prov.					
Frequency	47	0	2	0	50
% share	94	0	2	0	100
San Miguel, Baybay Leyte					
Frequency	50	0	0	0	0
% share	100	0	0	0	100
San Isidro, Baybay Leyte					
Frequency	50	0	0	0	50
% share	100	0	0	0	100
J.P. Laurel, Laguna					
Frequency	50	0	0	0	50
% share	100	0	0	0	100
Juan Santiago, Laguna					
Frequency	50	0	0	0	50
% share	100	0	0	0	100
Paitan, Mindoro					
Frequency	50	0	0	0	50
% share	100	0	0	0	100
Banilad, Mindoro					
Frequency	50	0	0	0	50
% share	100	0	0	0	100
TOTAL	387	5	4	4	400
(%)	-97	-1	-1	-1	-100

Source: 1989 Forest/Land-use Practices in the Philippines Study (FLUPPS) Survey.

Table 10
COMPARISON OF VILLAGES BY WOODY PERENNIALS ON PRIVATE PROPERTY OWNED

Villages	Number of Trees			Total
	0	1-10	more than 10	
Bila, Mountain Prov.				
Frequency	47	0	1	48
% share	94	0	2	100
Guinzadan, Mountain Prov.				
Frequency	49	0	0	50
% share	98	0	0	100
San Miguel, Baybay Leyte				
Frequency	50	0	0	50
% share	100	0	0	100
San Isidro, Baybay Leyte				
Frequency	50	0	0	50
% share	100	0	0	100
J.P. Laurel, Laguna				
Frequency	45	2	1	50
% share	90	4	2	100
Juan Santiago, Laguna				
Frequency	45	2	1	50
% share	90	4	2	100
Paitan, Mindoro				
Frequency	50	0	0	50
% share	100	0	0	100
Banilad, Mindoro				
Frequency	50	0	0	50
% share	100	0	0	100
TOTAL	386	4	3	398
(%)	(97)	(1)	(1)	(100)

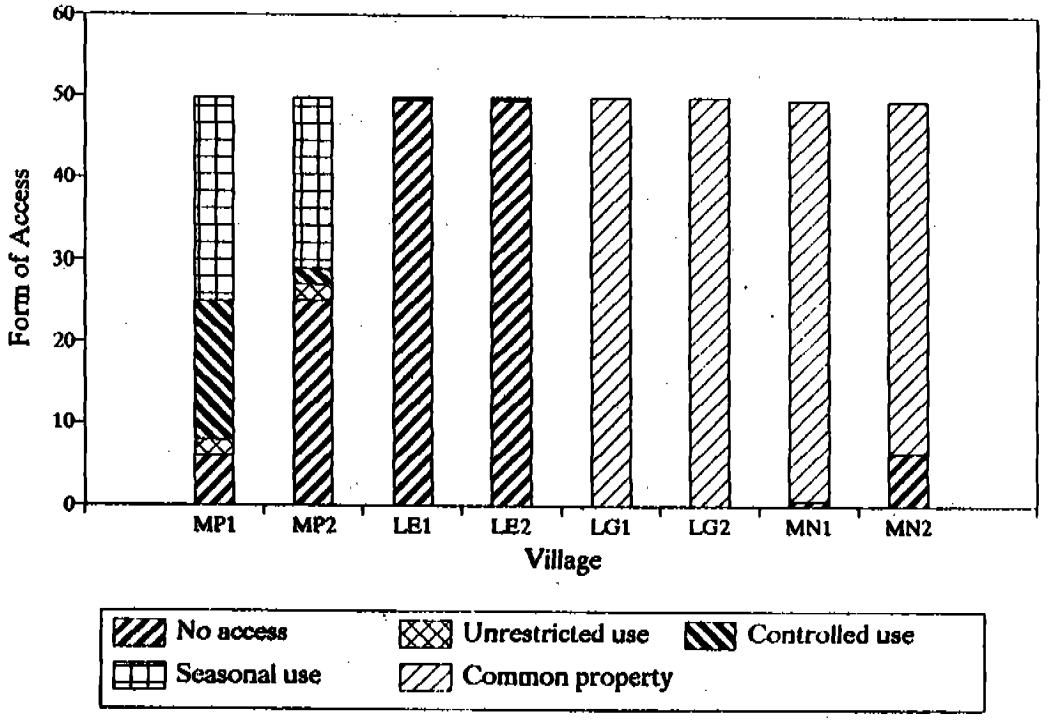
Source: 1989 Forest/Land-use Practices in the Philippines Study (FLUPPS) Survey.

Table 11
COMPARISON OF VILLAGES BY OTHER WOODY PERENNIALS ON PRIVATE PROPERTY RENTED

Villages	Number of Trees		
	0	9	Total
Bila, Mountain Prov.			
Frequency	50	0	50
% share	100	0	100
Guinzadan, Mountain Prov.			
Frequency	50	0	50
% share	100	0	100
San Miguel, Baybay Leyte			
Frequency	50	0	50
% share	100	0	100
San Isidro, Baybay Leyte			
Frequency	50	0	50
% share	100	0	100
J.P. Laurel, Laguna			
Frequency	50	0	50
% share	100	0	100
Juan Santiago, Laguna			
Frequency	49	1	50
% share	98	2	100
Paitan, Mindoro			
Frequency	50	0	50
% share	100	0	100
Banilad, Mindoro			
Frequency	50	0	50
% share	100	0	100
TOTAL	399	1	400
(%)	-100	nil	-100

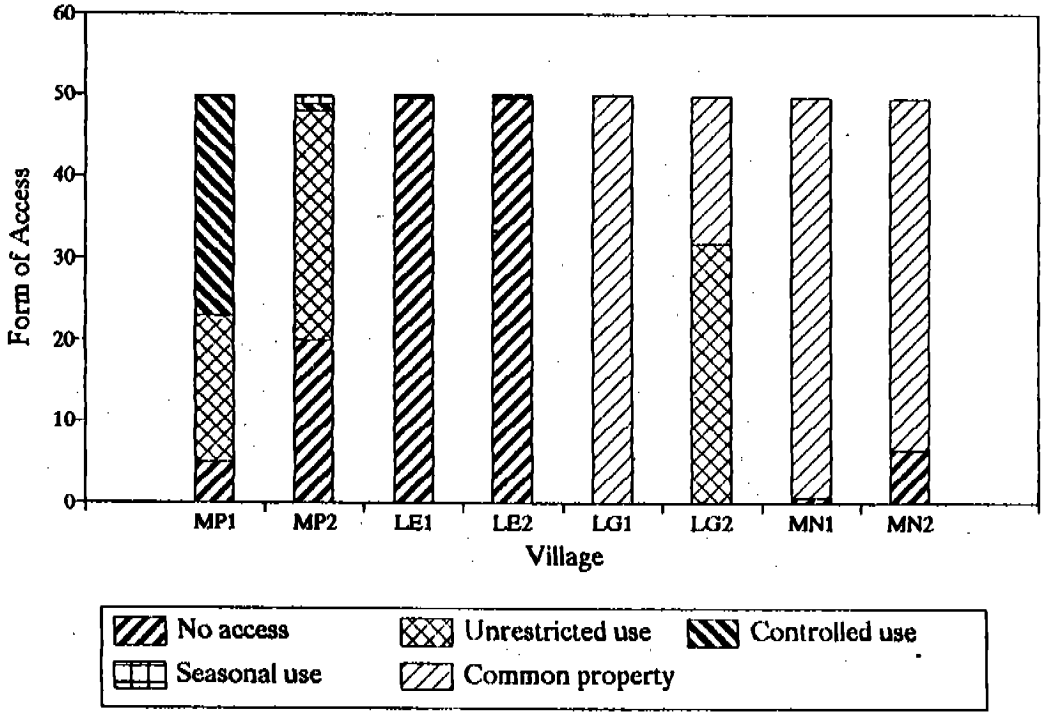
Source: 1989 Forest/Land-use Practices in the Philippines Study (FLUPPS) Survey.

Figure 4
COMPARISON OF VILLAGES BY ACCESS TO FALLOWS



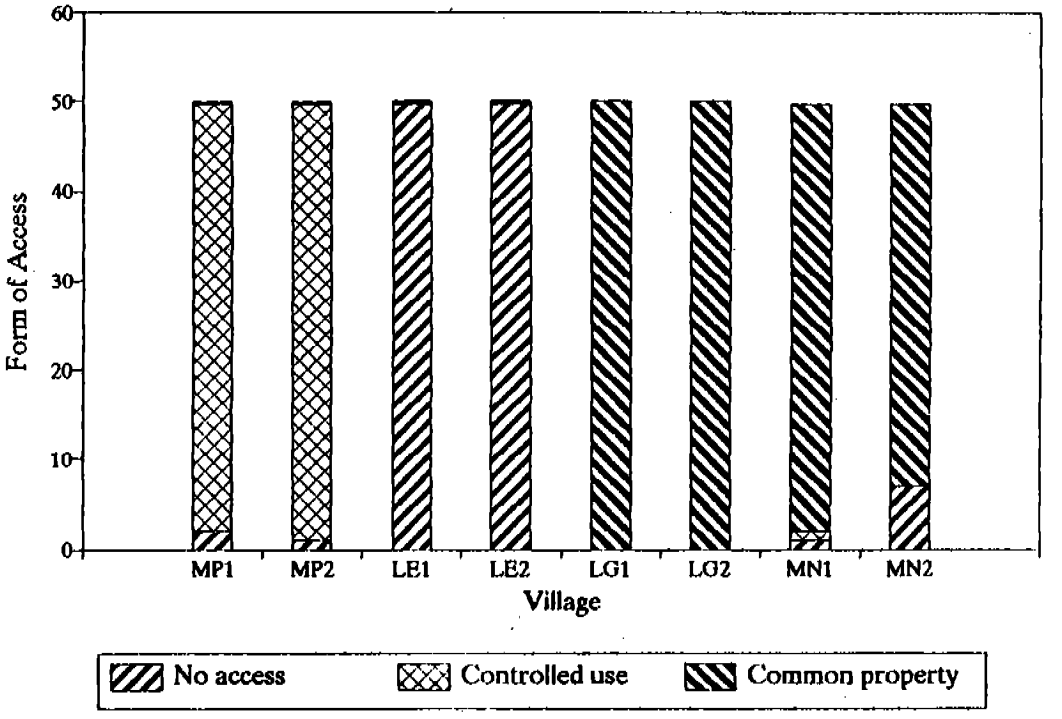
Source: See Appendix 3.

Figure 5
COMPARISON OF VILLAGES BY ACCESS TO BARREN LANDS



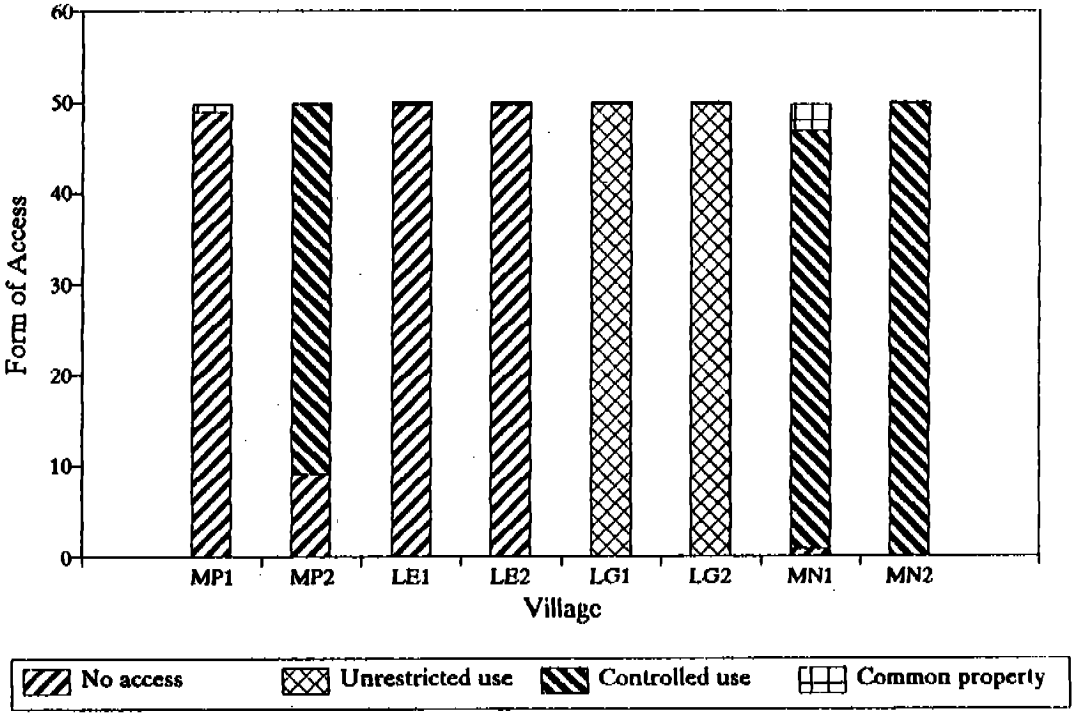
Source: See Appendix 4.

Figure 6
COMPARISON OF VILLAGES BY ACCESS TO VILLAGE FOREST



Source: See Appendix 5.

Figure 7
COMPARISON OF VILLAGES BY ACCESS TO STATE FORESTS



Source: See Appendix 6.

extension through the forestry station with the type of farm cropping system, where "non-traditional" refers to agroforestry and/or tree systems while "traditional" mainly implies annual agricultural crops.

Majority of the households in the eight villages do not avail of forestry extension services. Of those who avail, significantly higher percentage of non-traditional farmers use them for fodder (Figure 8), fuelwood (Figure 9), tree-borne foods (Figure 11) and handicrafts (Figure 12). Among the minority who avail of such services (whether for fodder, fuelwood, charcoal of tree-based food production purposes), higher percentages practice non-traditional cropping systems. One may thus conclude that forestry extension service is important in the on-farm practice of agro-forestry.

In the case of forestry extension on charcoal production, the question on the difference in tree management practice is irrelevant since charcoal could be produced from both wood and non-wood raw materials. Figure 10 shows no difference in tree management practice as far as forestry extension is concerned.

On the other hand, Table 12 and Figure 14 show that agricultural extension services are not significant in the practice of non-traditional systems. This is because agricultural extension workers do not extend much assistance in the uplands for livestock and tree-borne foods. However, there is a significant variation in the agricultural systems of those who make use of agricultural extension for fuelwood and those who do not. A higher percentage of non-traditional agriculturists avail of fuelwood-related extension work done by agricultural extension agents.

Tables 13 to 15 and Figures 15 to 28 relate farmsize categories with tree/forest-use practices. Figure 15 indicates that use of fodder is related to farm size. Majority of farmers, especially those cultivating small and medium-sized farms, do not use fodder. Furthermore, Table 13 shows that farm and forest practices of fodder users vary, with more of farmers with large-sized lands (31%) practicing non-traditional farm systems. All farmers appear to source their fodder from their respective farms, at an average rate of 81 percent (Table 14).

There is no variation across farmers grouped according to farm sizes in their tree product use and fuelwood use (Figures 16 and 17). Figure 16 shows that all types of farm sizes use tree and non-tree products in equal proportion. Majority of the fuelwood users have tree products as primary source, with a higher proportion of farmers with large-sized farms (96%) using wood-based energy (Figure 18). Figures 19 and 20 further show that farmers with large-sized farms tend to practice non-traditional cropping, including tree farming (51% for large vis-a-vis 27% and 18% for farmers with small and medium-sized farms, respectively). They also tend to rely more on their farms as a source of fuelwood (55%).

On the other hand, small farmers obtain fuelwood mostly from government and commercial forests (30% and 42%, respectively). An unexpected observation is that the landless use fuelwood from an on-farm source because farming other households' land gives access to fuelwood in these farms.

Meanwhile, Figure 21 and Table 15 show that use and sourcing of charcoal vary among farmer types. Higher proportions of the landless and farmers with large-sized farms use charcoal (28% and 22%, respectively) compared to the other groups. As expected, sourcing from government forests is prevalent among the landless (50%). On the other hand, farmers with small farms tend to get charcoal from either

Table 12
USE OF LIVESTOCK EXTENSION, BY FARM TREE MANAGEMENT PRACTICES

Use of government Forestry station	System		
Frequency (Percent)	Traditional	Non-Traditional	TOTAL
Not use service	160	54	214
	(96)	(98)	(97)
Use service	6	1	7
	(4)	(2)	(3)
TOTAL	166	55	221
	(75)	(25)	(100)

Fisher's exact test (2-tail), (Pr = 0.684)
Source: 1989 Forest Land-use Practices in the Philippines Study (FLUPPS) Survey.

Table 13
ON-FARM SYSTEM WHERE FODDER IS PRIMARILY SOURCED, BY FARM-SIZE CATEGORY

System Frequency (Percent)	Farm-size Category				
	Landless	Small	Medium	Large	Total
Traditional	11	5	5	60	81
	(92)	(83)	(100)	(69)	(74)
Non-Traditional	1	1	0	27	29
	(8)	(17)	0	(31)	(26)
TOTAL	12	6	5	87	110
	(11)	(5)	(5)	(79)	(100)

$X^2 = 5.068$ (Pr = 0.167); 62% of cells have counts less than 5.
L.R. $X^2 = 6.839$ (Pr = 0.077)
Source: 1989 Forest/Land-use Practices in the Philippines Study (FLUPPS) Survey.

Table 14
PRIMARY TREE SOURCE OF FODDER, BY FARM-SIZE CATEGORY

Source Frequency (Percent)	Farm-size Category				
	Landless	Small	Medium	Large	TOTAL
Government Forest	1	0	0	9	10
	(7)	0	0	(8)	(7)
Commercial Forest	1	2	0	10	13
	(7)	(25)	0	(9)	(10)
On-Farm	12	6	5	87	110
	(86)	(75)	(100)	(80)	(81)
Purchased	0	0	0	3	3
	0	0	0	(3)	(2)
TOTAL	14	8	5	109	136
	(10)	(6)	(4)	(80)	(100)

X^2 = 4.713 (Pr = 0.859); 6% of cells have counts less than 5.

L.R. X^2 = 6.099 (Pr = 0.73)

Source: 1989 Forest/Land-use Practices in the Philippines Study (FLUPPS) Survey.

Table 15
ON-FARM SYSTEM WHERE CHARCOAL IS PRIMARILY SOURCED, BY FARM-SIZE CATEGORY

System Frequency (Percent)	Farm-size Category				
	Landless	Small	Medium	Large	TOTAL
Traditional	3	1	1	18	23
	(75)	(100)	(33)	(67)	(66)
Non-Traditional	1	0	2	9	12
	(25)	0	(67)	(33)	(34)
TOTAL	4	1	3	27	35
	(11)	(3)	(9)	(77)	(100)

X^2 = 2.082 (Pr = 0.556); 75% of cells have counts less than 5.

L.R. X^2 = 2.314 (Pr = 0.51)

Source: 1989 Forest/Land-use Practices in the Philippines Study (FLUPPS) Survey.

Table 16
USES OF TREES IN THE PHILIPPINE STUDY VILLAGES

Species*	Use**										Total
	1	2	3	4	5	6	7	8	9	10	
ALBIFA		14					1		1		16
ALNUMA	1	19									20
ALSTMA		17		1			1	1	4		24
ARTOHE		1	2	81			4	2	1	1	92
BAMBSP		3					5		15		23
CHRYCA		6	2	41				9		14	72
CINNME	2	3					2	15	1	5	28
CITRMI		4		17				2		2	25
CITRNO		20		53				5			78
CLEIOP		10	10		7				1		28
COCONU	18	66	11	69			9		21	1	195
COFFAR		64	1	112				1		2	180
DIPTGR		13	3		6			1	2		25
GLIRSE	1	85	19					2		3	110
LANSDO		2		16							18
LEUCLE	64	86	24						15		189
MANGIN		2		62			3	4		2	73
MUSASA		7		29			1	3	27		67
MUSSPH		15	14								29
PASPCO	37										37
PENTCO		14	9		5						28
PERSAM		1	1	73			1	5		10	91
PINUKE		105									105
PSIDGU		17	5	72				11		5	110
SANDKO		10	2	25			1	1		4	43
SHORAS		6	11		7			1	1		26
SHORNE		6	2		8				6	1	23
SHORPO	1	28	1		3		8		35		76
SHORSP							8		38		46
SYZYCU				4				11		6	21
THEOCA				16							16
TRISDE		10	6		1						17
VITEPA					1		1		20		22
Total per use	124	634	123	671	38	0	45	74	188	56	1953

*See Appendix 28 for explanation of species code

**Uses:

1=Fodder
2=Fuelwood
3=Charcoal
4=Fruit/Other Food
5=Timber/Construction Materials
6=Industrial Use
7=Handicrafts
8=Other Regular Use
9=House Construction
10=Other Occasional Use

Source: 1989 Forest/Land-use Practices in the Philippines Study (FLUPPS) Survey.

Table 17
LOCATION OF TREES IN THE PHILIPPINE STUDY VILLAGES

Species*	Location of Trees**										Total
	1	2	3	4	5	6	7	8	9	10	
ALBIFA	1			4			11				16
ALNUMA	2	6	4	4	2		2				20
ALSTMA	8			2	2		12				24
ARTOHE	1				36	1	17	26	11		92
BAMBSP				2	6		3	2	10		23
CHRYCA			1	1	36	1	3	20	10		72
CINNME	16					12					28
CITRMI					3	1	4	17			25
CITRNO	1				13			64			78
CLEIOP	28										28
COCONU	3	1		3	37	8	6	116	20	1	195
COFFAR	2	1		4	59		14	100			180
DIPTGR	19			1			3	2			25
GLIRSE	15		1	4	11		3	76			110
LANSDO					2			16			18
LEUCLE	11	3	2	13	23	6	54	69	6	2	189
MANGIN	2			2	16	2	3	30	18		73
MUSASA					18		4	17	27	1	67
MUSSPH	29										29
PASPCO	1				16			16		4	37
PENTCO	26							2			28
PERSAM	5			2	30		28	17	8	1	91
PINUKE	37	11	55	1		1					105
PSIDGU	2	4		7	63		1	23	10		110
SANDKO					13		1	29			43
SHORAS	26										26
SHORNE	16						5	1	1		23
SHORPO	40			6			25	2	3		76
SHORSP	3				1				42		46
SYZYCU					12		1	7	1		21
THEOCA	1				5			10			16
TRISDE	17										17
VITEPA	4					1		2	15		22
Total per use	316	26	63	56	404	33	200	664	182	9	1953

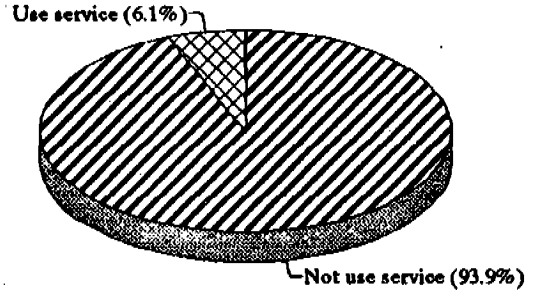
*See Appendix 28 for explanation of species codes.
** Locations:

1=State/Government Forests	6=Farm;Plot with only trees
2=Private Forests	7=Farm;Agroforestry Sys.
3=Common Forests	8=Farm;Scattered Trees
4=Other Commons	9=Purchased Tree Products
5=Homesteads/Homegardens	10=Non-Tree Products

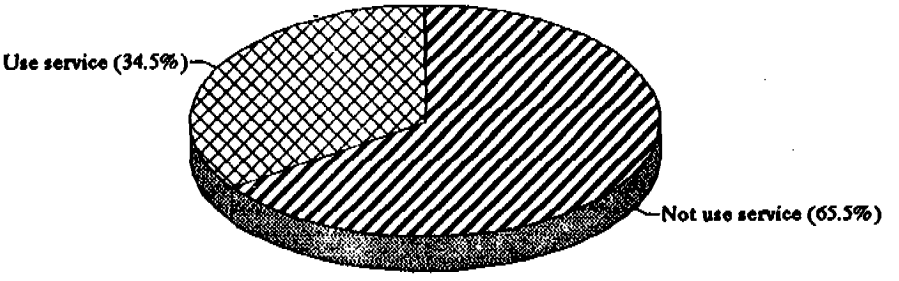
Source: 1989 Forest/Land-use Practices in the Philippines Study (FLUPPS) Survey.

Figure 8
USE OF FOREST EXTENSION (GOVERNMENT) FOR FODDER,
BY FARM TREE MANAGEMENT PRACTICE

a. Traditional



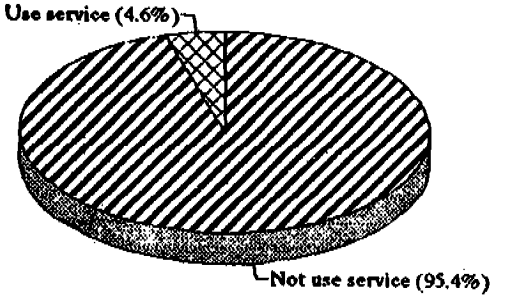
b. Non - traditional



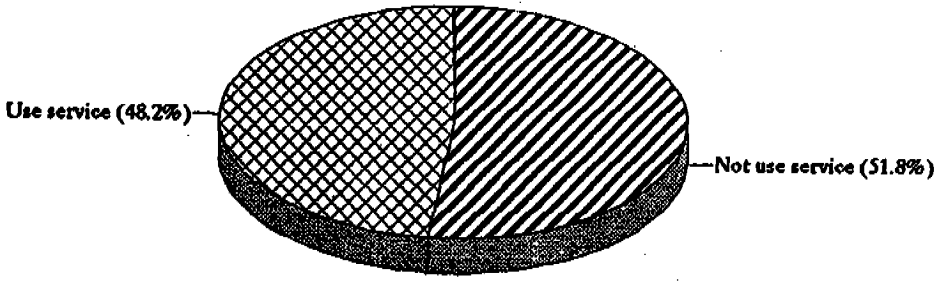
Source: See Appendix 7.

Figure 9
USE OF FOREST EXTENSION (GOVERNMENT) FOR FUELWOOD,
BY FARM TREE MANAGEMENT PRACTICE

a. Traditional



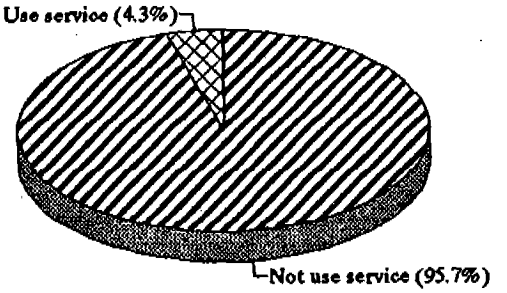
b. Non - traditional



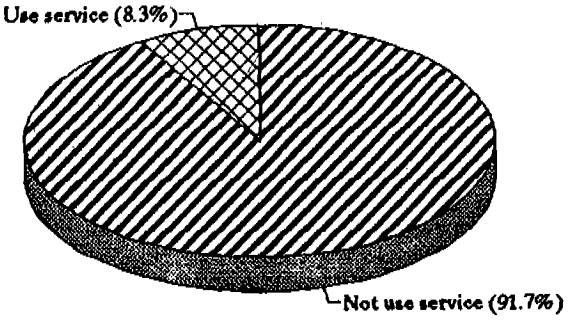
Source: See Appendix 8.

Figure 10
USE OF FORESTRY EXTENSION (GOVERNMENT) FOR CHARCOAL, BY TREE MANAGEMENT PRACTICE

a. Traditional



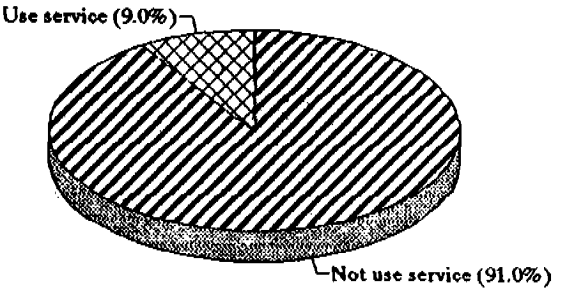
b. Non - traditional



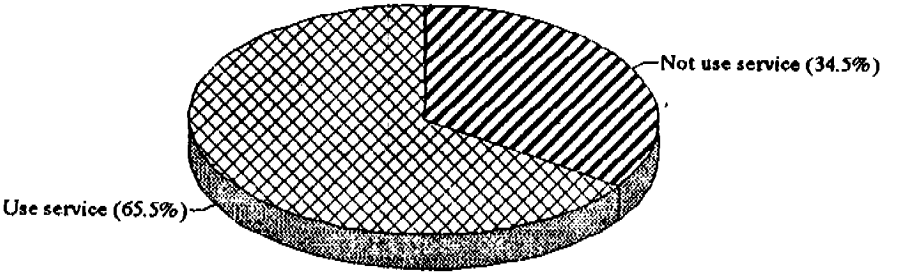
Source: See Appendix 9.

Figure 11
USE OF FORESTRY EXTENSION (GOVERNMENT) FOR TREE-BORNE FOODS, BY TREE MANAGEMENT PRACTICE

a. Traditional



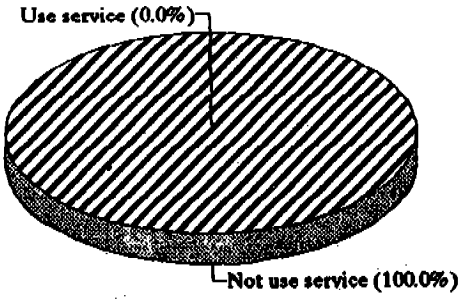
b. Non - traditional



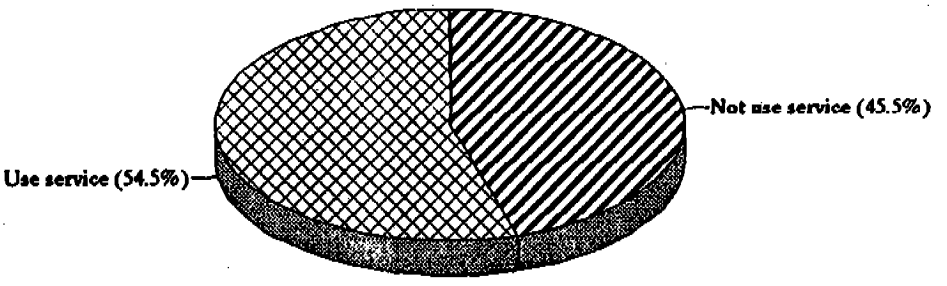
Source: See Appendix 10.

Figure 12
USE OF FORESTRY EXTENSION (GOVERNMENT) FOR HANDICRAFTS, BY FARM TREE MANAGEMENT PRACTICE

a. Traditional

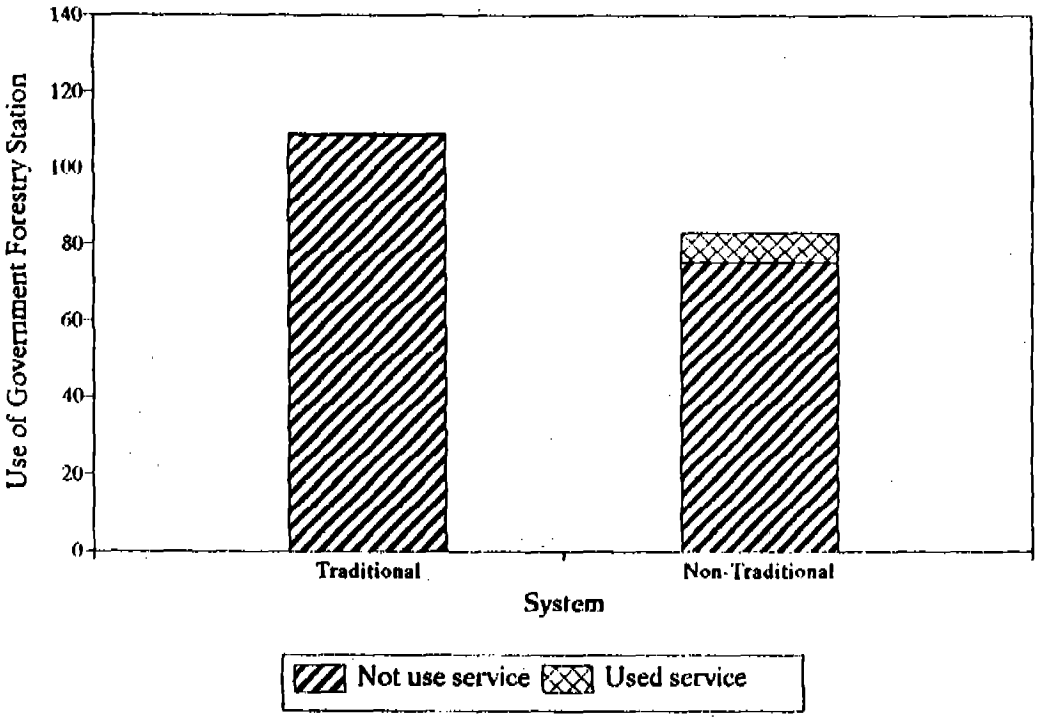


b. Non - traditional



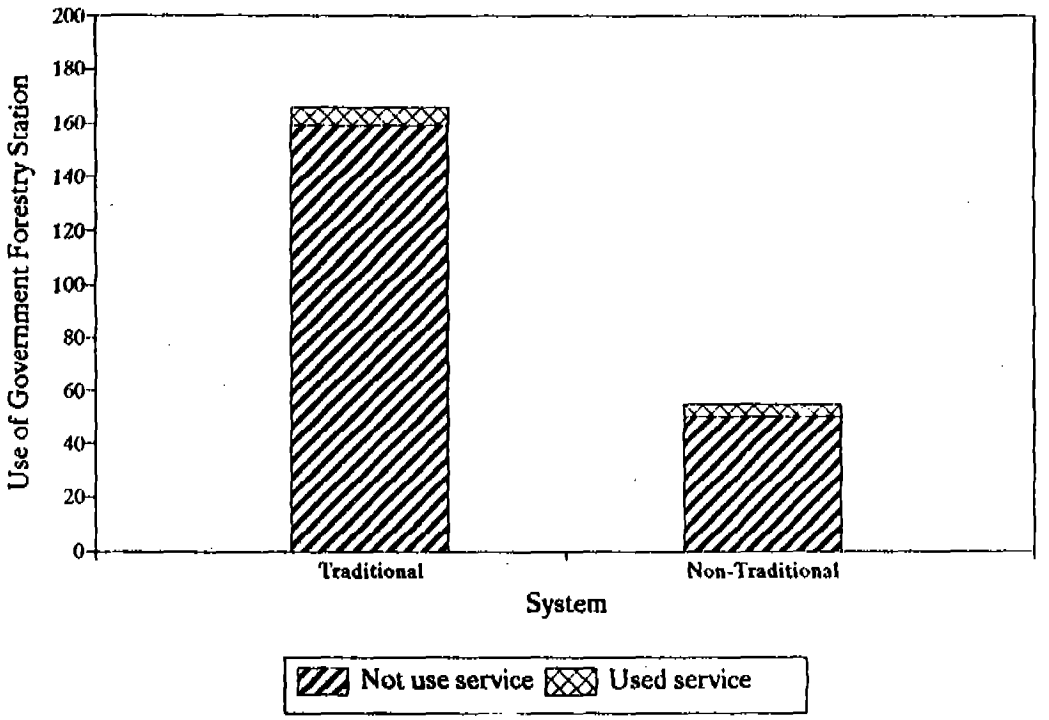
Source: See Appendix 11.

Figure 13
USE OF AGRICULTURAL EXTENSION FOR FUELWOOD,
BY FARM TREE MANAGEMENT PRACTICE



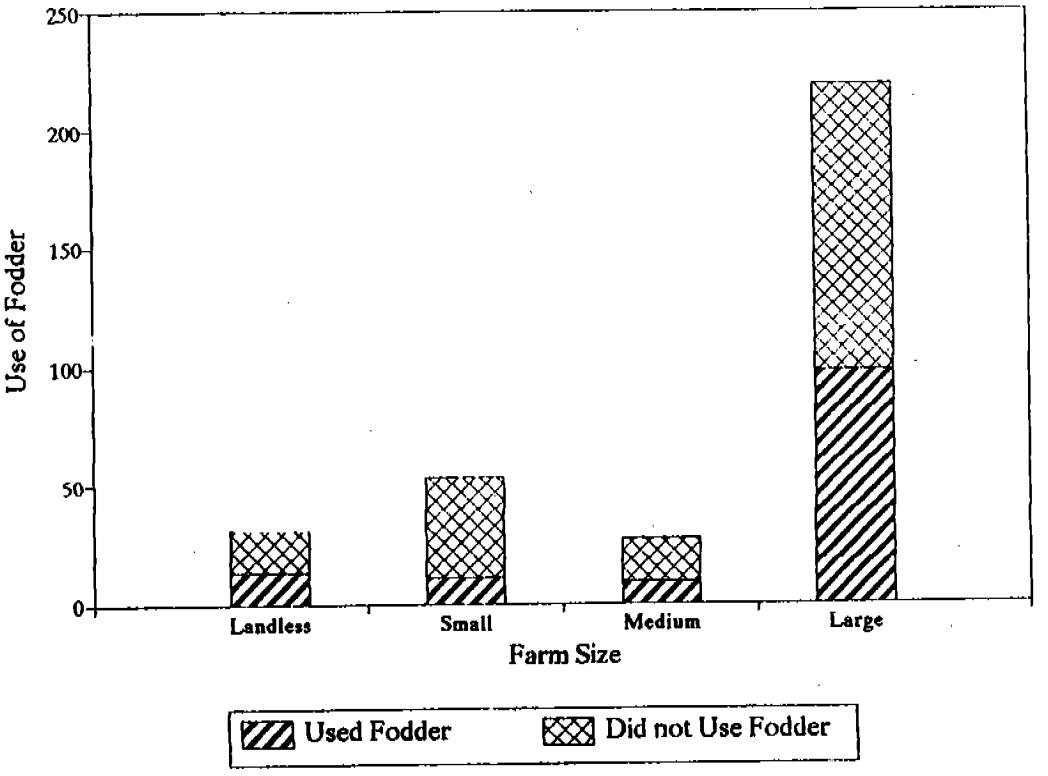
Source: See Appendix 12.

Figure 14
USE OF AGRICULTURAL EXTENSION FOR TREE-BORNE FOODS,
BY FARM TREE MANAGEMENT PRACTICE



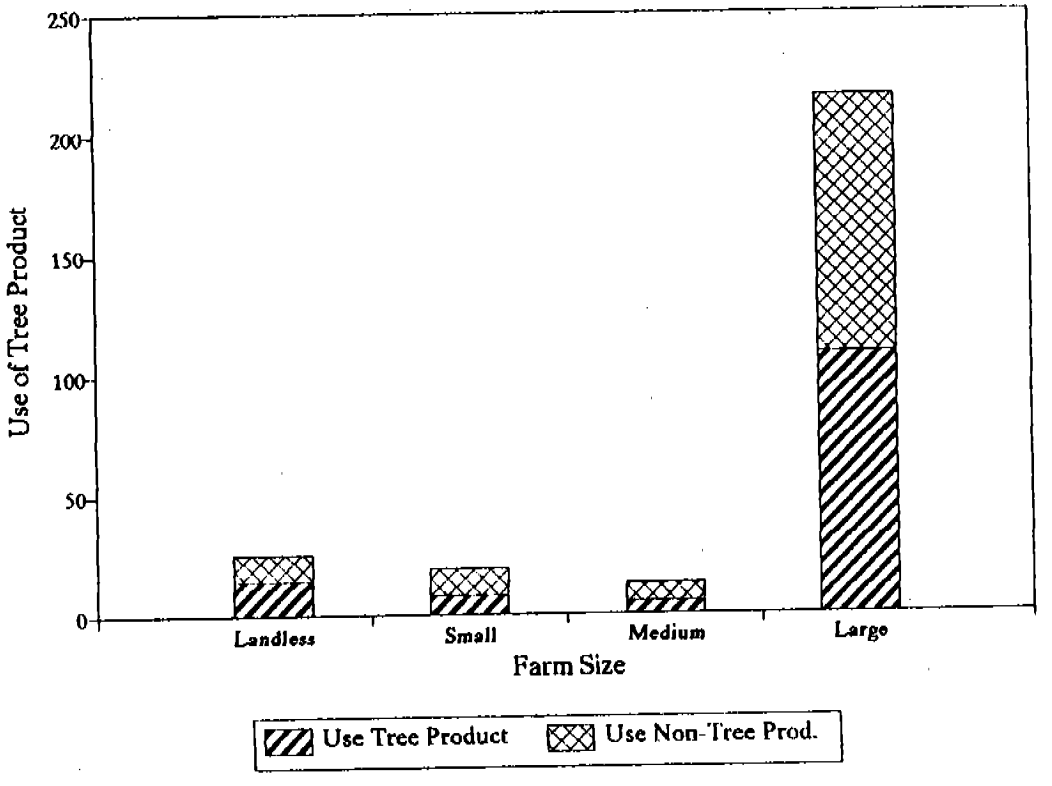
Source: See Appendix 13.

Figure 15
FODDER USE, BY FARM SIZE



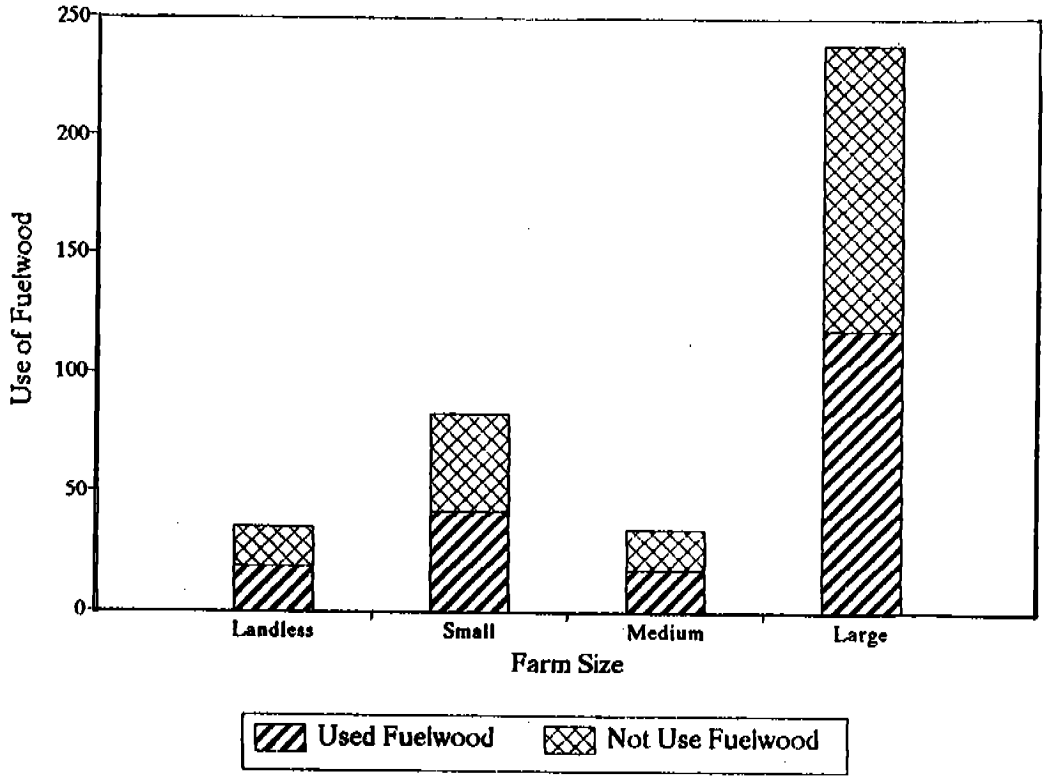
Source: See Appendix 14.

Figure 16
TREE PRODUCT USE, BY FARM SIZE



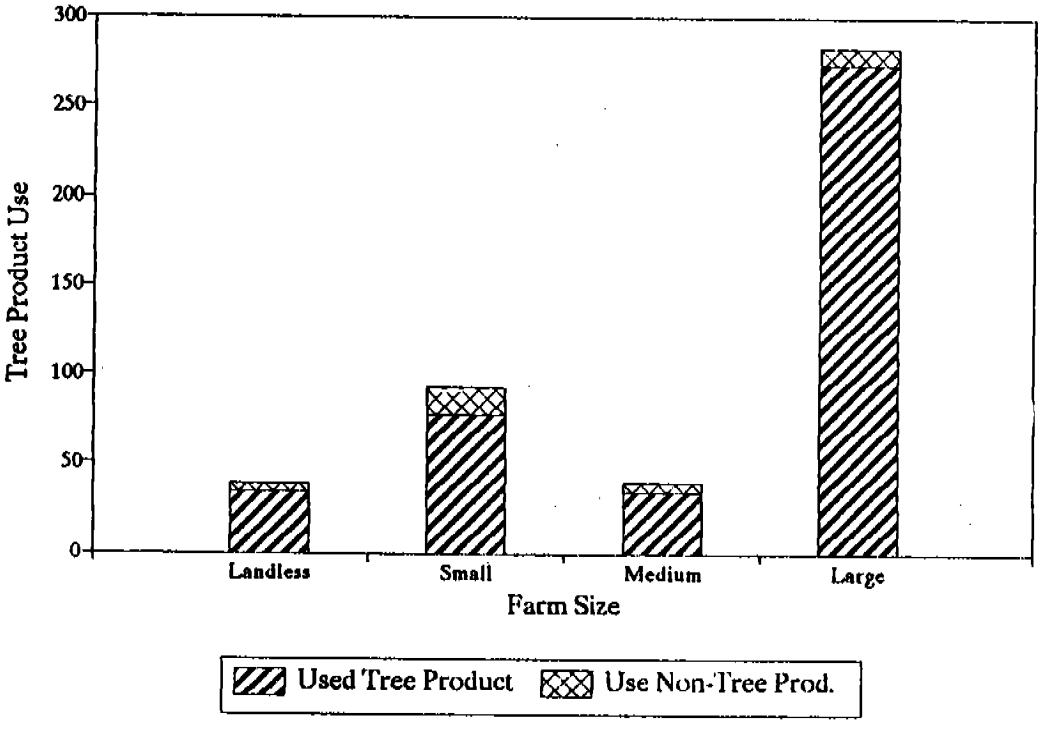
Source: See Appendix 15.

Figure 17
FUELWOOD USE, BY FARM SIZE



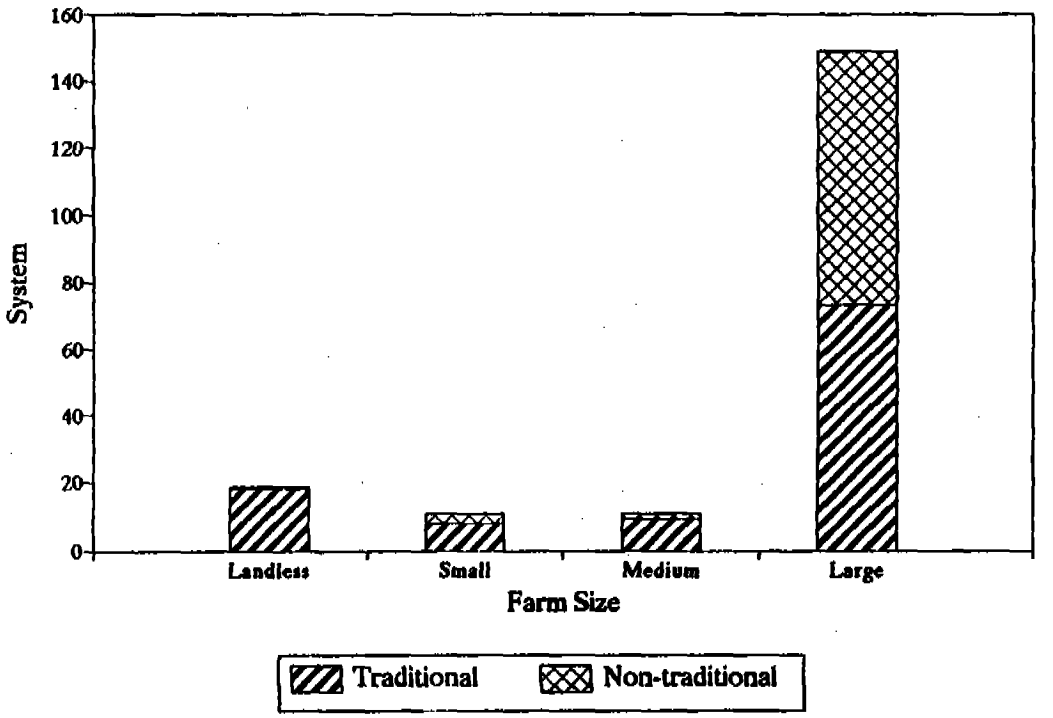
Source: See Appendix 16.

Figure 18
TREE PRODUCT AS PRIMARY FUEL SOURCE, BY FARM SIZE



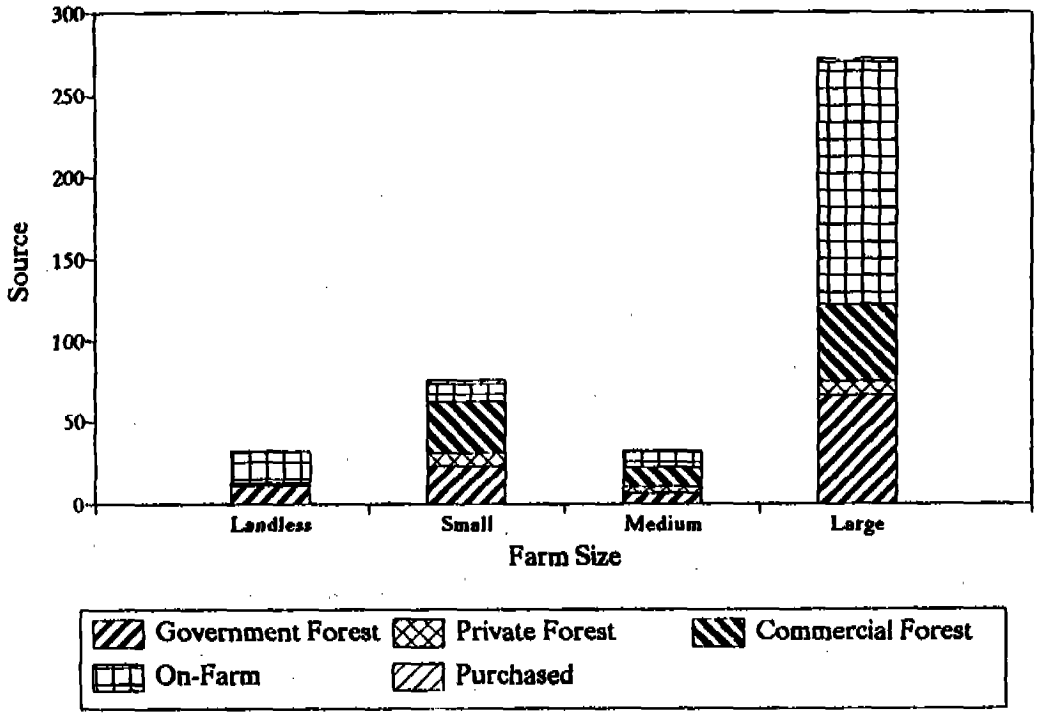
Source: See Appendix 17.

Figure 19
ON-FARM SYSTEM WHERE FUEL IS PRIMARILY SOURCED, BY FARM SIZE



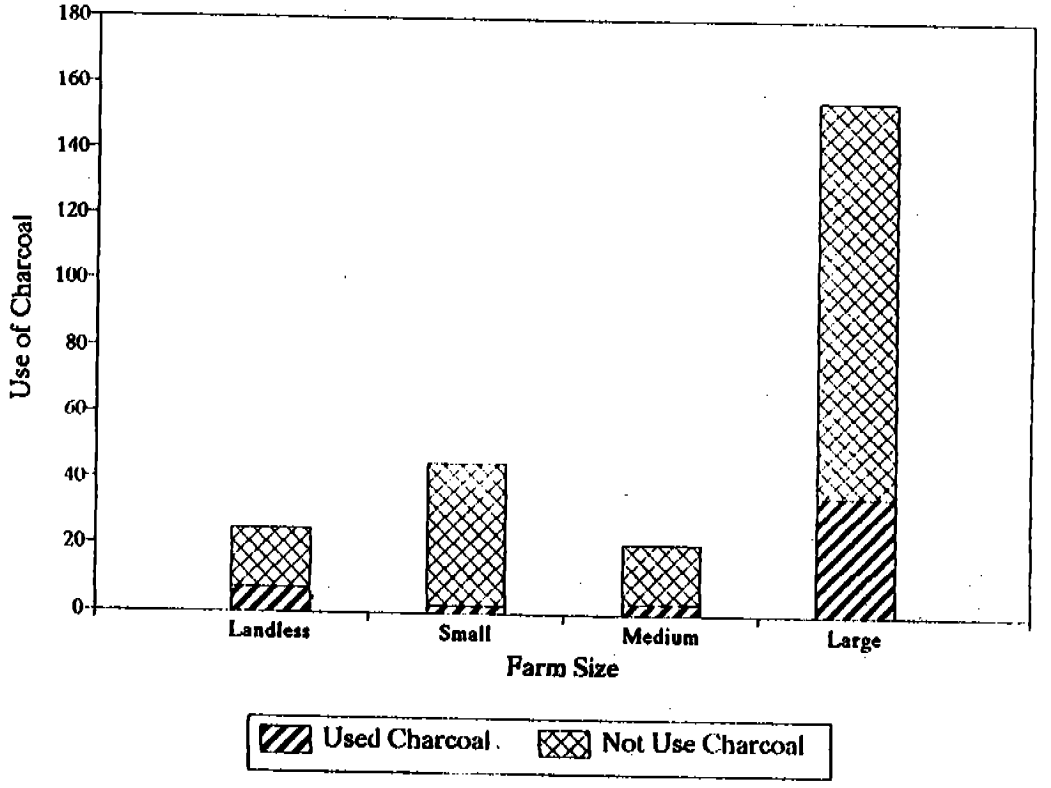
Source: See Appendix 18.

Figure 20
PRIMARY WOOD SOURCE OF FUELWOOD, BY FARM SIZE



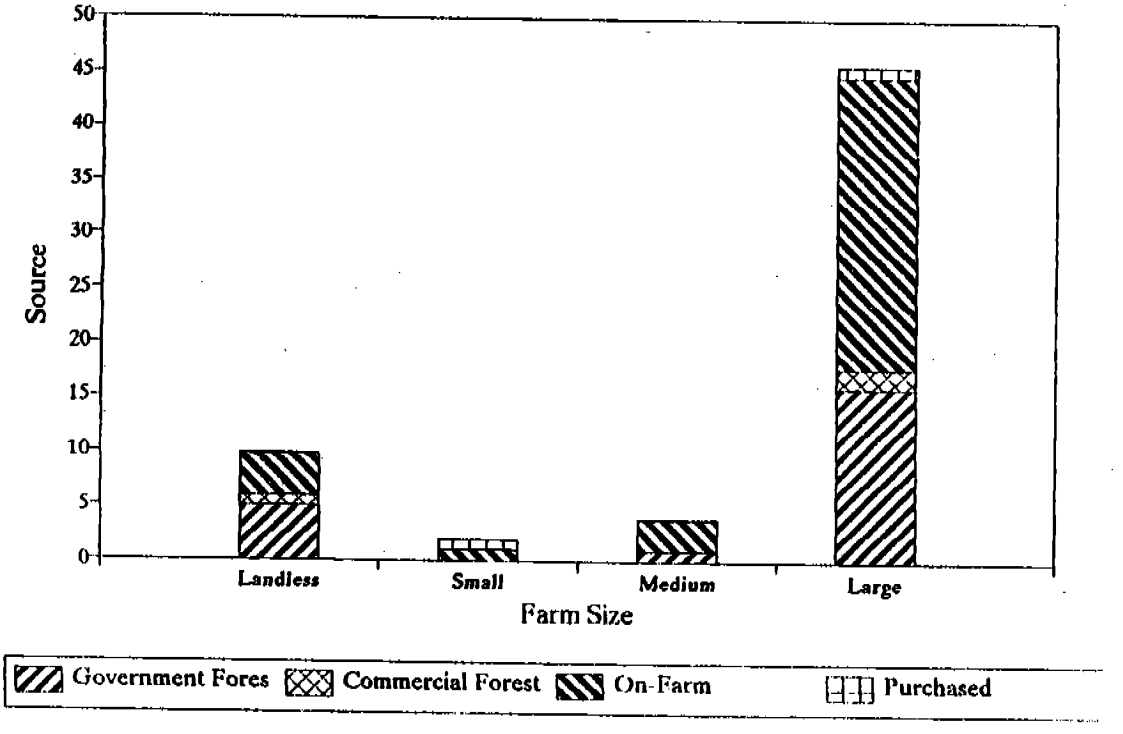
Source: See Appendix 19.

Figure 21
CHARCOAL USE, BY FARM SIZE



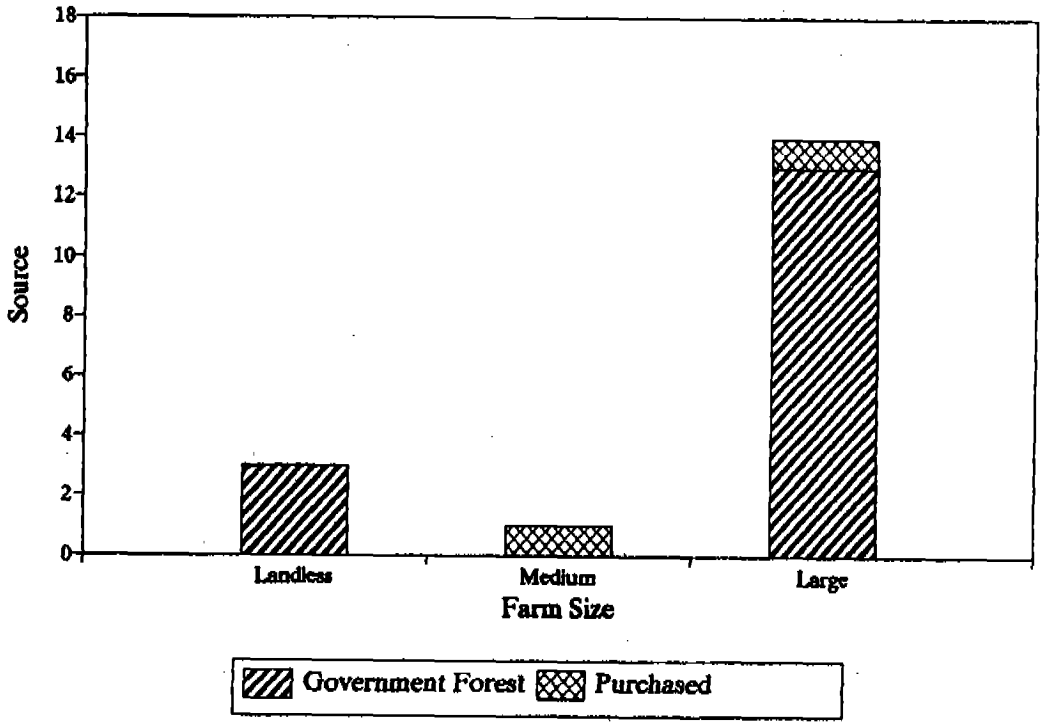
Source: See Appendix 20.

Figure 22
PRIMARY CHARCOAL SOURCE OF FUEL, BY FARM SIZE



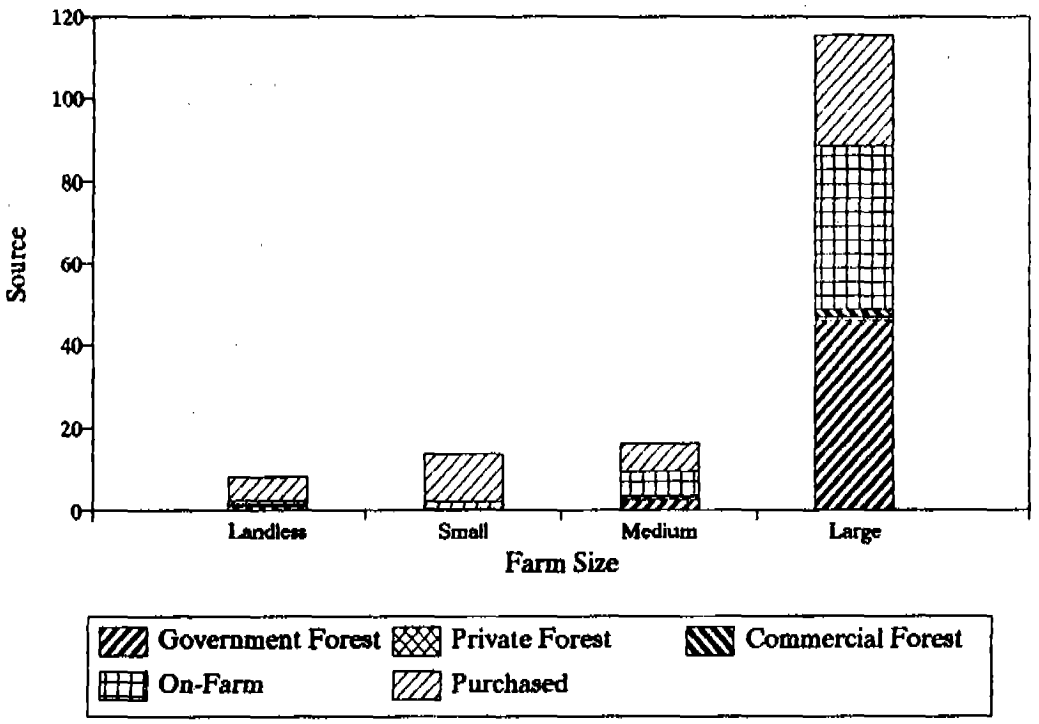
Source: See Appendix 21.

Figure 23
PRIMARY TREE SOURCE OF TIMBER AND OTHER CONSTRUCTION MATERIALS, BY FARM SIZE



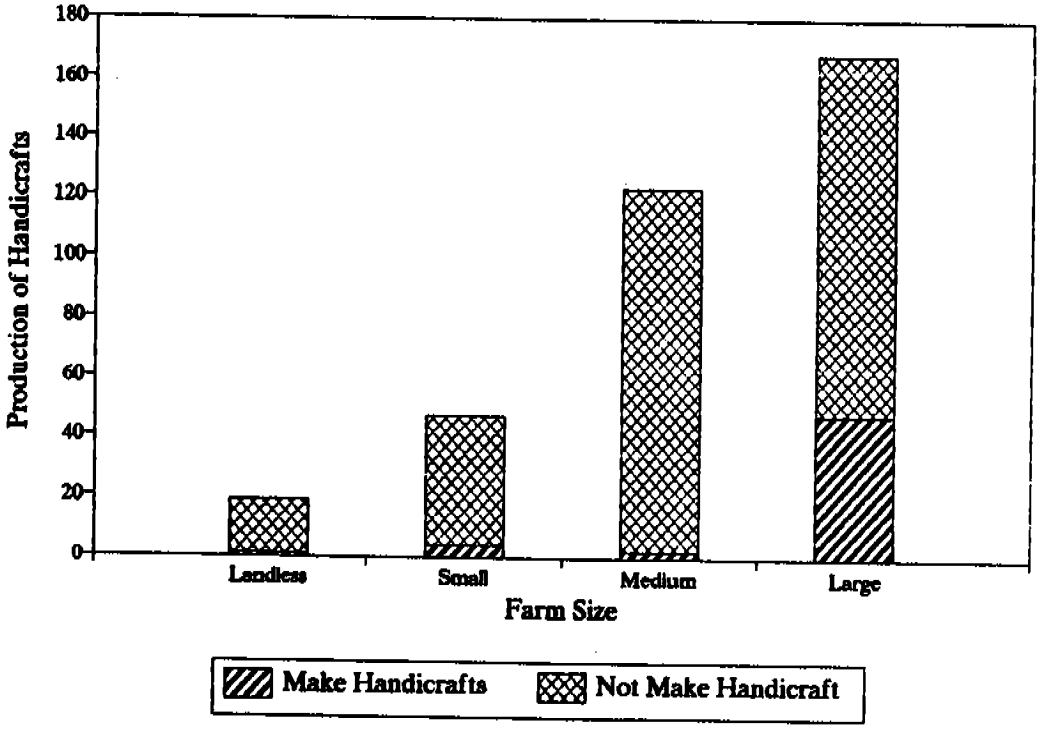
Source: See Appendix 22 .

Figure 24
PRIMARY TREE SOURCE OF HOUSE CONSTRUCTION MATERIALS, BY FARM SIZE



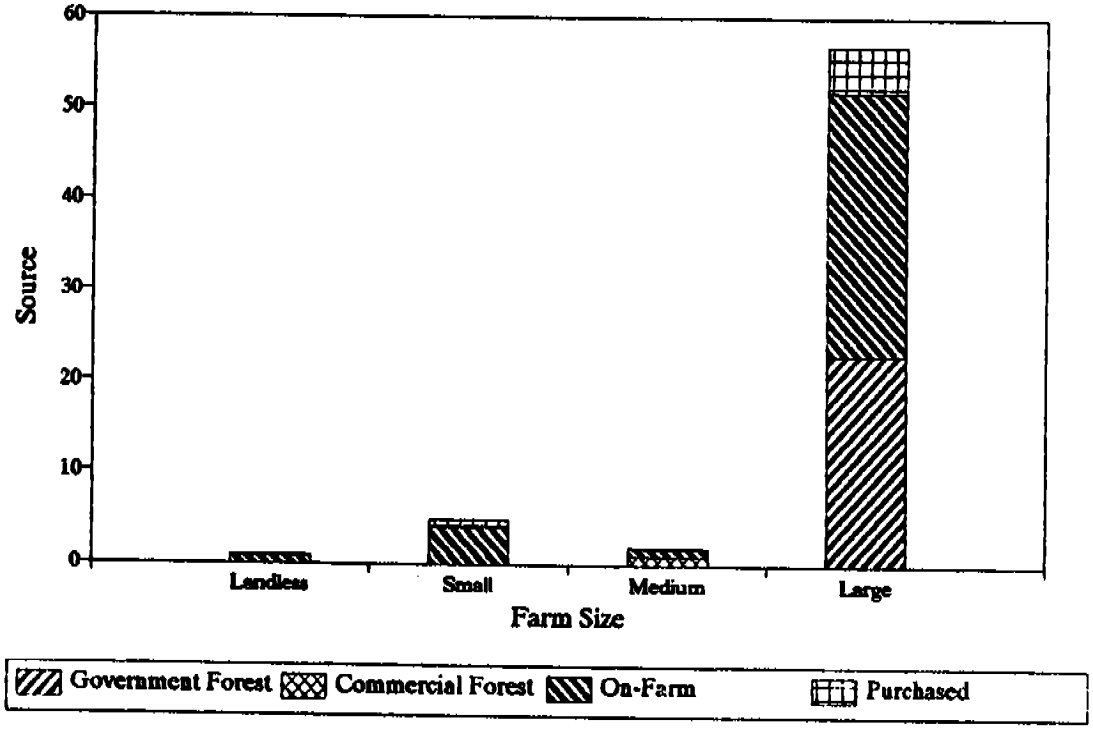
Source: See Appendix 23.

Figure 25
TREE-BASED HANDICRAFTS PRODUCTION, BY FARM SIZE



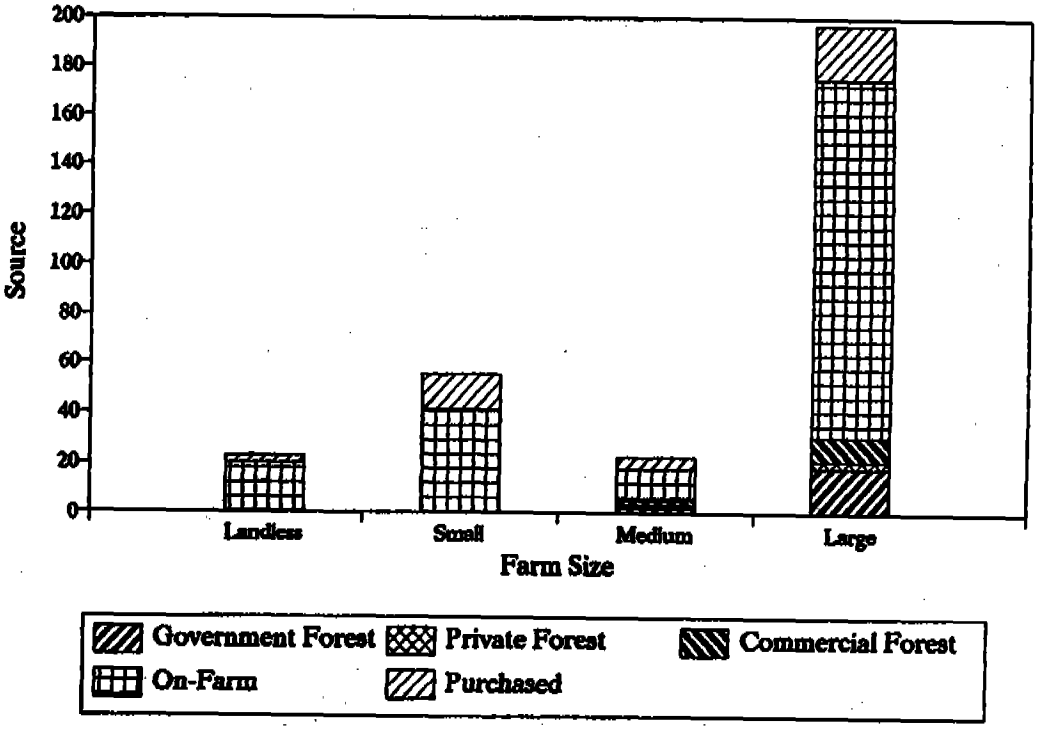
Source: See Appendix 24.

Figure 26
PRIMARY TREE SOURCE OF HANDICRAFTS MATERIALS, BY FARM SIZE



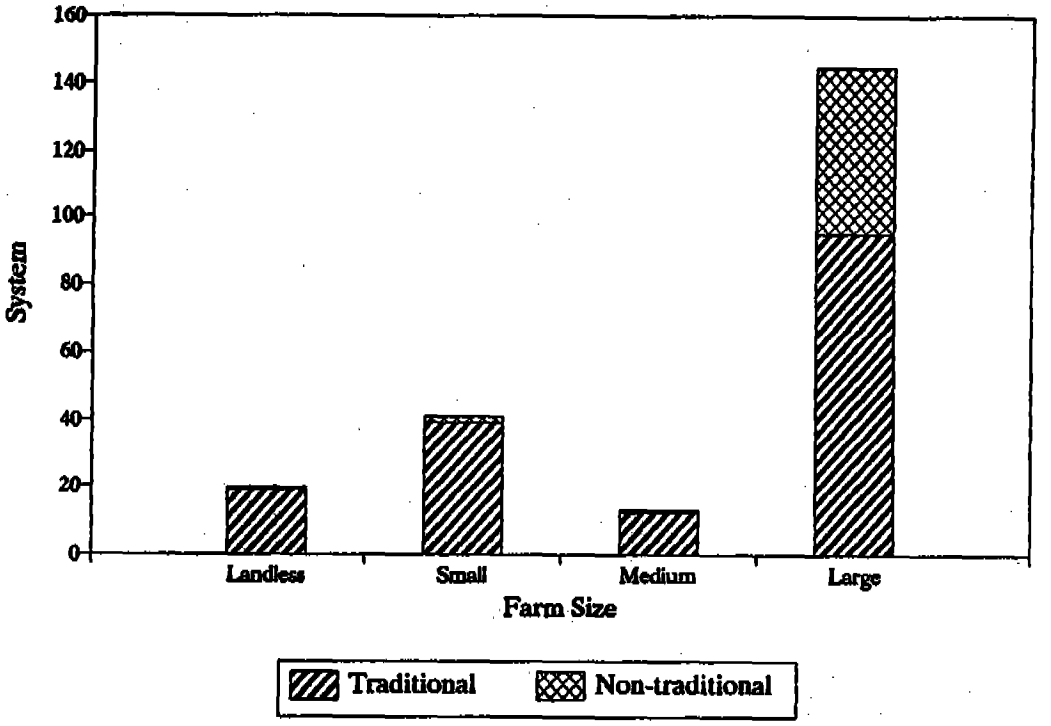
Source: See Appendix 25.

Figure 27
PRIMARY SOURCE OF TREE-BORNE FRUIT/FOOD, BY FARM SIZE



Source: See Appendix 26.

Figure 28
ON-FARM SYSTEM WHERE TREE-BORNE FOOD IS PRIMARILY SOURCED, BY FARM SIZE



Source: See Appendix 27.

the farm or the market. Farmers with medium and large-sized farms, meanwhile, obtain charcoal from their farms (Figure 22).

Figure 25 shows that tree-based production of handicrafts differs among farmer categories, with the practice being more prevalent among the medium and large-sized farms. This is because among the villages investigated, production of handicrafts (rattan-based) is prominent in the Mindoro area where farm sizes also tend to be larger than in the other communities. For farmers with large-sized farms, government forests are a significant source of handicraft materials compared to other household groups (Figure 26).

Sourcing of tree-borne food (fruits, nuts) differs among the farm-size categories (Figure 27). Farmers with large-sized farms get such food mostly from traditional sources compared with the others (Figure 28). While most farms practice traditional farm systems, a higher percentage (34%) among farmers with large-sized farms make use of non-traditional systems.

C. *Tree Use Practices*

Tables 16 and 17 present the tree species available for various uses as well as their location. The use of fuelwood is prevalent, with ipil and coconut as major species (Table 16). These are mostly located in homegardens or are scattered in the farms (Table 17). While the two tables indicate the importance of these uses and tree species, the lack of quantitative estimates on the exact used amounts of particular species from specific locations preclude hard estimates on stress on forest resources.

D. *Results of Regression Analysis*

Attempts were made to quantify relationships among key variables through the conduct of regression analysis. For example, the regression results in Table 18 show that fuelwood gathered increases as tree products become more important vis-a-vis total income (including cash and non-cash). The reverse is true when the spouse spends more time in agriculture.

However, the aggregate picture varies considerably given the specific conditions of each site. Table 19 indicates that there is no significant relationship between fuelwood gathering on the one hand, and cash income and household size, on the other. But in Bila, Mountain Province and Paitan, Mindoro, these variables have positive effects on the amount of fuelwood gathered.

Table 20 shows how certain variables influence the use of state forest lands. The use of government forestry extension services makes access to smaller areas of state forests possible. This is not surprising since information gathered from extension workers on the proper use of forest land may lead to a more controlled use of the uplands.

The second regression result in Table 20 shows that the larger the area owned and operated by households, the smaller the state forest area used. Conversely, this trend implies that the need for land is indeed a strong contributory factor to population pressure on state forests. Although the regressions derived do not fully account for the (other) factors that determine public forest, land-use, the results show statistically significant relationships, which, however, have low predictive capability.

Table 18
REGRESSION ANALYSIS OF FUELWOOD
COLLECTION ON SELECTED VARIABLES, SIX VILLAGES

Variable	Intercept (t-value)	Regression Coefficient (t-value)	F-value (R2)
Percent of income from tree products consumed or sold of total income	6.345 (7.132)**	0.148 (4.987)**	24.872 ** (0.396)
Percent of time spent by spouse on agriculture	10.064 (7.965)**	-0.063 (-1.929)*	3.721* (0.089)

Notes: * significant at 0.10 level
** significant at 0.05 level

Source: 1989 Forest/Land-use Practices in the Philippines Study (FLUPPS) Survey.

Table 19
REGRESSION ANALYSIS OF TOTAL FUELWOOD COLLECTED ON SELECTED VARIABLES

Village, Province	Regr. Runs	Regression Coefficient of Independent Variables (t-value)			
		Intercept	Total HHold Population (t-value)	Total Annual Cash Income (t-value)	F-value (R2)
Bila, Mt. Province	Regr. 1	4.107 (4.806)**	0.260 (2.378)**		5.656** (0.197)
	Regr. 2	4.900 (8.069)**		0.000 (2.365)**	5.593** (0.196)
Paitan, Mindoro	Regr. 1	2.629 (0.589)ns	2.120 (2.319)**		5.377** (0.221)
PHILIPPINES	Regr. 1	7.677 (8.142)**	-0.032 (-0.237)ns		0.056 ns 0.000
	Regr. 2	7.384 (14.043)**		0.000 (0.348)ns	0.121 ns (0.001)

Notes:
ns = not significant
** = significant at 0.05 level
* = significant at 0.10 level

Source: 1989 Forest/Land-use Practices in the Philippines Study (FLUPPS) Survey.

Table 20
REGRESSION ANALYSIS OF PERCENT FUELWOOD COLLECTED
FROM STATE FORESTS ON SELECTED VARIABLES, SIX VILLAGES

Variable	Intercept (t-value)	Regression Coefficient (t-value)	F-value (R2)
Use of government forestry extension services	71.960 (11.827)**	-22.293 (-2.244)**	5.034** (0.117)
Area owned and operated by households	70.527 (12.314)**	-3.176 (-2.231)**	4.979** (0.116)

Notes: * significant at 0.10 level
** significant at 0.05 level

Source: 1989 Forest/Land-use Practices in the Philippines Study (FLUPPS) Survey.

Tables 21 and 22 show unexpected results obtained for Paitan, Mindoro, and the aggregated analysis, respectively. Both tables imply that more time spent on wage labor and by the spouse in agriculture lead to an increased fuelwood gathering in state forests. On the other hand, as expected, larger farms imply lower incidence of fuelwood gathering from state forests.

Table 23 shows the regression estimates when the amount of fuelwood gathered is the dependent variable. It shows the expected inverse relationship between the importance of kerosene and fuelwood gathering for both the aggregated results and the separated estimates of the study sites. On the other hand, another unexpected result is obtained with respect to collection time and the amount gathered, i.e., more time spent on woodgathering implies lower fuelwood gathering. This situation is due to the diminishing marginal returns of fuelwood gathering with possibly capturing more travel time than collection time itself. This observation indicates the accessibility of available forests which implies the negative effect of deforestion on communities dependent on fuelwood. On the average, some 7.8 hours per household is spent on fuelwood gathering per day, which implies much less time available for farm as well as for households activities (Table 26, variable FUEL6).

Note the insignificance of regression results in Table 23 for individual village estimates, except for J.P. Laurel because of the lack of variation among certain variables within the same village. Thus, while most social scientists usually require case studies to include site and culture-specific conditions, there is basis for analyzing several sites based on uniformly gathered data in order to detect variations in important variables.

Table 24 shows the regression of percentage of fuelwood gathered from state forests on various farmer-specific variables. The aggregated results imply that the proportion of fuelwood gathered from state forests rises with the dependency ratio and decreases with farm size. Both relationships are expected because they show the effects of increased household demand and alternative (farm-based) supply on state forest use. However, these results are quite different for Paitan, Mindoro. The more important determinants of state forest use for fuelwood are cash income from tree products (which may include fuelwood) and the percentage of time spent by the household head on wage labor.

Fuelwood gathered from state forests are affected by different combinations of factors as shown in Table 25. Regression 1 indicates that the important variables are total annual cash income and percent of time spent by households on wage labor. Both variables have positive relationships with sourcing from state forests. Regression 2 does not indicate statistically significant results while regression 3 shows that the larger the total farm size, the lower the amount of fuelwood gathered from government forests. The fourth result shows that higher time allocation by the spouse on agriculture leads to more gathering of fuelwood from state forests.

It is difficult to come up with definite conclusions on these hypothesized relationhips between the independent variables and fuelwood gathering. The listing in Table 27, for instance, does not allow for sound generalizations on such relationships.

Pooling the observations across households in various sites may have resulted in distributions which are unexpected. Many of the variables summarized in Table 26, for instance, show that the standard deviation is higher than the means. This problem can be solved by using a random sample of sites across the country in the overall research methodology.

Table 21
REGRESSION ANALYSIS OF PERCENT FUELWOOD GATHERED FROM STATE FORESTS ON SELECTED VARIABLES

		Regression Coefficient of Independent Variables						
		Intercept (t-value)	% Time Spent by HHead on Wage Labor (t-value)	% Time Spent by Spouse on Agriculture (t-value)	Total Annual Cash Income (t-value)	Total Farm Size, in has. (t-value)	Area Owned & operated (t-value)	F-value (R2)
Paitan, Mindoro		27.698 (3.972)**	0.740 (2.759)**					7.612** (0.488)
		22.753 (2.266)**		1.637 (1.947)*				3.790* (0.322)
		23.114 (2.236)*			0.003 (1.824)*			3.325* (0.294)
PHILIPPINES	Regr. 1	61.172 (10.888)**	0.278 (0.989)					0.979 ns (0.025)
	Regr. 2	55.856 (8.635)**		0.305 (1.836)*				3.373* (0.082)
	Regr. 3	53.779 (8.676)**			0.001 (2.468)**			6.089* (0.138)
	Regr. 4	78.090 (14.408)**				-11.097 (-4.251)**		18.070** (0.322)
	Regr. 5	70.530 (12.314)**					-3.176 (-2.231)**	4.979** (0.116)

Note: * significant at 0.10 level
** significant at 0.05 level
ns-not significant

Source: 1989 Forest/Land-use Practices in the Philippines Study (FLUPPS) Survey.

Table 22

REGRESSION ANALYSIS OF FUELWOOD GATHERED FROM STATE FORESTS ON SELECTED LABOR ALLOCATION VARIABLES

Variable	Intercept (t-value)	Regression Coefficient (t-value)	F-value (R2)
Percent time of household head on agriculture and/or industrial wage labor			
MINDORO	27.153 (4.825)**	0.749 (3.161)**	9.993** (0.500)
Percent time of spouse spent on agriculture			
PHILIPPINES	55.856 (8.635)**	0.305 (1.836)*	3.373* (0.081)
LAGUNA	21.120 (2.460)**	1.670 (2.176)**	4.734** (0.321)
Percent income from tree products consumed or sold of total income			
PHILIPPINES	70.070 (12.954)**	-0.449 (-2.492)**	6.212** (0.140)

Notes: * significant at 0.10 level
** significant at 0.05 level

Source: 1989 Forest/Land-use Practices in the Philippines Study (FLUPPS) Survey.

Table 23

REGRESSION ANALYSIS OF TOTAL FUELWOOD COLLECTED ON SELECTED VARIABLES

		Regression Coefficient of Independent Variables (t-value)			
Village, Province	Intercept	% of fuelwood collected from own land	Time spent in collecting (in hrs.)	% Consumption of kerosene to total fuel used	F-value (R2)
Bila, Mt. Province	8.77 (4.89)**	-0.04 (-1.56)	-0.52 (-1.44)	-0.01 (-0.43)	1.65 (0.20)
Guinzadan, Mt. Province	6.81 (6.30)**	0.02 (0.77)	-0.02 (-0.50)	-0.94 (-1.26)	0.89 (0.14)
J.P. Laurel, Laguna	7.46 (3.37)**	0.03 (2.21)**	-0.37 (-0.71)	-0.28 (-1.66)*	3.48** (0.37)
Juan Santiago, Laguna	8.79 (5.76)**	-0.02 (-1.42)	-0.33 (-1.05)	-0.21 (-1.08)	1.84 (0.24)
Paitan, Mindoro	14.89 (6.03)**	-0.21 (-0.51)	-0.61 (-1.00)	0.00 (.)	0.57 (0.05)
Banilad, Mindoro	10.68 (5.12)**	0.00 (.)	-0.57 (-1.30)	0.00 (.)	1.70 (0.12)
PHILIPPINES	8.79 (14.74)**	-0.01 (-1.04)	-0.06 (-1.49)*	-0.10 (1.66)*	2.27* (0.50)

Notes:

. = no estimate

** = significant at 0.05 level

* = significant at 0.10 level

Source: 1989 Forest/Land-use Practices in the Philippines Study (FLUPPS) Survey.

Table 24
REGRESSION ANALYSIS OF PERCENT OF FUELWOOD GATHERED FROM STATE FORESTS ON SELECTED VARIABLES

Village, Province	Regression Coefficient of Independent Variables (t-value)					
	Intercept	Dependency ratio	% of cash income from tree products	% of time spent by Hhead on wage labor	% of time spent by spouse on agriculture	Total farm size (in ha)
PHILIPPINES	60.184 (6.979)**	0.071 (1.972)*	0.099 (0.449)ns	0.268 (1.158)ns	0.196 (1.398)ns	-10.536 (-2.938)**
Paitan, Mindoro	5.556 (0.382)ns	-0.053 (-0.633)ns	0.538 (3.109)**	0.979 (4.444)**	0.782 (1.520)ns	-0.801 (-0.170)ns

Notes:
ns = not significant
** = significant at 0.05 level
* = significant at 0.10 level

Source : 1989 Forest/Land-use Practices in the Philippines Study (FLUPPS) Survey.

Table 25

REGRESSION ANALYSIS OF PERCENT OF FUELWOOD GATHERED FROM STATE FORESTS ON SELECTED VARIABLES, SIX VILLAGES

Regression Coefficient of Independent Variables (t-value)	Regression Runs			
	1	2	3	4
Intercept	27.541	64.831	73.084	56.643
(t-value)	(3.522)**	(8.628)**	(9.974)**	(7.165)**
Total annual cash income	0.001			
(t-value)	(3.639)**			
% of time spent by Hhead on wage labor	0.571	0.260	0.231	
(t-value)	(2.541)**	(0.913)	(0.945)	
% of time spent by spouse on agriculture	0.533			0.338
(t-value)	(3.867)**			(2.134)**
Time spent in collecting	0.403		0.189	0.333
(t-value)	(1.548)		(0.643)ns	(1.081)
% of cash income from tree products		-0.232	0.074	-0.311
(t-value)		(0.771)	(0.321)ns	(-1.168)
Area owned and operated by households		-1.396		-0.267
(t-value)		(-0.614)ns		(-0.128)ns
Total farm size (ha)			-10.876	
(t-value)			(-2.906)**	
F-value	6.898**	1.923*	4.396**	3.047**
(R2)	(0.463)	(0.194)	(0.355)	(0.276)

Notes:
* = significant at 0.10 level
** = significant at 0.05 level
ns = not significant

Source: 1989 Forest/Land-use Practices in the Philippines Study (FLUPPS) Survey.

Table 26
DEFINITION OF VARIABLES, MEANS & STANDARD DEVIATIONS, PHILIPPINES

Variable Name	Definition	Mean	Standard Deviation
HHPOP	Household population	5.776	2.968
DEPRATIO	Dependency ratio	140.466	160.342
TOTALCAS	Total Annual Cash Income	7,673.043	11,673.460
OTHRFUEL	% consumption of other fuel to total fuel used	27.167	34.025
KEROSENE	% consumption of kerosene to total fuel used	9.130	8.528
FUELWOOD	% consumption of fuelwood to total fuel used	80.078	26.206
CHARCOAL	% consumption of charcoal to total fuel used	14.160	9.488
TOTTPC	Total tree products both foe household use & for sale	19.415	30.257
TOTWLHH	% time spent by Hhead on wage labor	13.300	22.792
AGRISP	% time spent by spouse on agriculture	25.878	28.207
FUEL6	Time spent in gathering fuelwood per day	7.762	15.241
TOTALFAR	Total farm size (in ha)	1.633	1.972
TOTAREA	Total area owned & operated	1.879	3.174
TOTOWN24	Farm area used for tree crops and agroforestry system (in ha)	2.611	4.961
GVTFRST	Use of government forestry extension services	0.213	0.410

Source: 1989 Forest/Land-use Practices in the Philippines Study (FLUPPS) Survey.

Table 27
SUMMARY OF REGRESSION ANALYSIS

Independent variables	Dependent variables	
	Fuelwood collection	% of fuelwood gathered from state forests
% of income from tree products consumed or sold of total income		
Philippines	+	scaling problem
Paitan, Mindoro		+
% of time spent by spouse on agriculture		
Philippines	-	+
Laguna		+
Paitan, Mindoro		+
Total household population		
Philippines	-	
Bila, Mt. Province	+	
Paitan, Mindoro	+	
Total annual cash income		
Philippines	scaling problem	+
Bila, Mt. Province	+	
Paitan, Mindoro		+
Use of government forestry extension services		
Philippines		-
Area owned and operated		
Philippines		-
Total farm size		
Philippines		-
Paitan, Mindoro		-
% of time spent by household head on wage labor		
Philippines		+
Mindoro		+
Time spent in collecting		
Philippines		-/+
J.P. Laurel, Laguna		-
% of fuelwood collected from own land		
Philippines		-
J.P. Laurel, Laguna		+
% consumption of kerosene to total fuelwood used		
Philippines		-
J.P. Laurel, Laguna		-
Dependency ratio		
Philippines		+
Paitan, Mindoro		-

Thus, regression analysis should be conducted on a site-basis. However, most results obtained for the individual sites may not yield meaningful estimates. This may be expected because there is not much variation in specific variables within the same site (e.g., incomes do not differ much when almost all members of the community are poor, etc.)

IV. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Support for upland and foresty development activities in the eight study sites, though positive, was not substantial to conduct extensive analysis on the effect of government intervention on forest-tree use practices. Nevertheless, the practice of non-traditional farm systems (tree system of agro-forest) is desirable because it spares the use of public forests. Such systems have developed despite limited government intervention mechanisms.

Significant relationships can be observed between forest, land and tree-use practices and farmers categorized according to land size/ownership. Upland project managers must grant more secured property rights to the small and medium landholders under the social forestry projects, particularly in their early stages. With respect to the landless, fuelwood comes mostly from farms, implying that this group is not that important as far as forest depletion from fuelwood gathering is concerned.

Gathering of fuelwood contributes significantly in depleting forest resources. The extent of such activities and the factors that determine them should be monitored. Among the upland dwellers, the following variables were found to be important: (1) income from other tree products; (2) time spent for gathering; (3) farming system practiced; and (4) farm size. Another possible important source of forest destruction are the fuelwood traders who do not reside in upland areas. This group should also be investigated in future studies.

Data gathering activities should be conducted uniformly on forest, land-use and tree-use practices in several sites in the country. This procedure allows for more variation in the information being collected to enable meaningful measurement of the relationships of variables investigated. Such effort as well as a random sampling of the households and the sites covered will provide a better basis for broad policy formulation. To determine the site and culture specific conditions, surveys should likewise be accompanied by case studies which provide information important to upland project implementors in the field-level.

Appendix 1

COMPARISON OF VILLAGES BY TREES ON COMMON PROPERTY OWNED

Villages	Number of Trees 0	3	10	60	Total
Bila, Mountain Prov.					
Frequency	47	1	1	1	50
% share	94	2	2	2	100
Guinzadan, Mountain Prov.					
Frequency	50	0	0	0	50
% share	100	0	0	0	100
San Miguel, Baybay Leyte					
Frequency	50	0	0	0	50
% share	100	0	0	0	100
San Isidro, Baybay Leyte					
Frequency	50	0	0	0	50
% share	100	0	0	0	100
J.P. Laurel, Laguna					
Frequency	50	0	0	0	50
% share	100	0	0	0	100
Juan Santiago, Laguna					
Frequency	50	0	0	0	50
% share	100	0	0	0	100
Paitan, Mindoro					
Frequency	50	0	0	0	50
% share	100	0	0	0	100
Banilad, Mindoro					
Frequency	50	0	0	0	50
% share	100	0	0	0	100
TOTAL	397	1	1	1	400
(%)	-99	(n.s.)	(n.s.)	(n.s.)	-100

Source: 1989 Forest/Land-use Practices in the Philippines Study (FLUPPS) Survey.

Appendix 2
COMPARISON OF VILLAGES BY ACCESS TO COMMONS

Villages	Forms of access					Total
	No access	Unrestricted use	Controlled regulated	Seasonal use	Common property	
Bila, Mountain Prov.						
Frequency	6	17	25	1	1	50
% share	12	34	50	2	2	100
Guinzadan, Mountain Prov.						
Frequency	20	29	0	0	1	50
% share	40	58	0	0	2	100
San Miguel, Baybay Leyte						
Frequency	50	0	0	0	0	50
% share	100	0	0	0	0	100
San Isidro, Baybay Leyte						
Frequency	50	0	0	0	0	50
% share	100	0	0	0	0	100
J.P. Laurel, Laguna						
Frequency	0	0	0	0	50	50
% share	0	0	0	0	100	100
Juan Santiago, Laguna						
Frequency	0	0	0	0	50	50
% share	0	0	0	0	100	100
Paitan, Mindoro						
Frequency	1	0	1	0	48	50
% share	2	0	2	0	96	100
Banilad, Mindoro						
Frequency	7	0	1	0	42	50
% share	14	0	2	0	84	100
TOTAL	134	46	27	1	192	400
(%)	(34)	(12)	(7)	nil	(48)	(100)

Source: 1989 Forest/Land-use Practices in the Philippines Study (FLUPPS) Survey.

Appendix 3
COMPARISON OF VILLAGES BY ACCESS TO FALLOWS

Villages	Forms of access					Total
	No access	Unrestricted use	Controlled regulated	Seasonal use	Common property	
Bila, Mountain Prov.						
Frequency	6	2	17	25	0	50
% share	12	4	34	50	0	100
Guinzadan, Mountain Prov.						
Frequency	25	2	2	21	0	50
% share	50	4	4	42	0	100
San Miguel, Baybay Leyte						
Frequency	50	0	0	0	0	50
% share	100	0	0	0	0	100
San Isidro, Baybay Leyte						
Frequency	50	0	0	0	0	50
% share	100	0	0	0	0	100
J.P. Laurel, Laguna						
Frequency	0	0	0	0	50	50
% share	0	0	0	0	100	100
Juan Santiago, Laguna						
Frequency	0	0	0	0	50	50
% share	0	0	0	0	100	100
Paitan, Mindoro						
Frequency	1	0	0	0	49	50
% share	2	0	0	0	98	100
Banilad, Mindoro						
Frequency	7	0	0	0	43	50
% share	14	0	0	0	86	100
TOTAL	139	4	19	46	192	400
(%)	-35	-1	-5	-12	-48	-100

Source: 1989 Forest/Land-use Practices in the Philippines Study (FLUPPS) Survey.

Appendix 4
COMPARISON OF VILLAGES BY ACCESS TO BARREN LANDS

Villages	Forms of access					
	No access	Unrestricted use	Controlled regulated	Seasonal use	Common property	Total
Bila, Mountain Prov.						
Frequency	5	18	27	0	0	50
% share	10	36	54	0	0	100
Guinzadan, Mountain Prov.						
Frequency	20	28	1	1	0	50
% share	40	56	2	2	0	100
San Miguel, Baybay Leyte						
Frequency	50	0	0	0	0	50
% share	100	0	0	0	0	100
San Isidro, Baybay Leyte						
Frequency	50	0	0	0	0	50
% share	100	0	0	0	0	100
J.P. Laurel, Laguna						
Frequency	0	0	0	0	50	50
% share	0	0	0	0	100	100
Juan Santiago, Laguna						
Frequency	0	32	0	0	18	50
% share	0	64	0	0	36	100
Paitan, Mindoro						
Frequency	1	0	0	0	49	50
% share	2	0	0	0	98	100
Banilad, Mindoro						
Frequency	7	0	0	0	43	50
% share	14	0	0	0	86	100
TOTAL	133	78	28	1	160	400
(%)	-33	-20	-7	(n.s.)	40	-100

Source: 1989 Forest/Land-use Practices in the Philippines Study (FLUPPS) Survey.

Appendix 5

COMPARISON OF VILLAGES BY ACCESS TO VILLAGE FOREST

Villages	Forms of access			
	No access	Controlled regulated	Common property	Total
Bila, Mountain Prov.				
Frequency	2	48	0	50
% share	4	96	0	100
Guinzadan, Mountain Prov.				
Frequency	1	49	0	50
% share	2	98	0	100
San Miguel, Baybay Leyte				
Frequency	50	0	0	50
% share	100	0	0	100
San Isidro, Baybay Leyte				
Frequency	50	0	0	50
% share	100	0	0	100
J.P. Laurel, Laguna				
Frequency	0	0	50	50
% share	0	0	100	100
Juan Santiago, Laguna				
Frequency	0	0	50	50
% share	0	0	100	100
Paitan, Mindoro				
Frequency	1	1	48	50
% share	2	2	96	100
Banilad, Mindoro				
Frequency	7	0	43	50
% share	14	0	86	100
TOTAL	111	98	191	400
(%)	28	24	48	100

Source: 1989 Forest/Land-use Practices in the Philippines Study (FLUPPS) Survey.

Appendix 6
COMPARISON OF VILLAGES BY ACCESS TO STATE FORESTS

Villages	Forms of access				Total
	No access	Unrestricted use	Controlled Regulated	Common Property	
Bila, Mountain Prov.					
Frequency	49	0	0	1	50
% share	98	0	0	2	100
Guinzadan, Mountain Prov.					
Frequency	9	0	41	0	50
% share	18	0	82	0	100
San Miguel, Baybay Leyte					
Frequency	50	0	0	0	50
% share	100	0	0	0	100
San Isidro, Baybay Leyte					
Frequency	50	0	0	0	50
% share	100	0	0	0	100
J.P. Laurel, Laguna					
Frequency	0	50	0	0	50
% share	0	100	0	0	100
Juan Santiago, Laguna					
Frequency	0	50	0	0	50
% share	0	100	0	0	100
Paitan, Mindoro					
Frequency	1	0	46	3	50
% share	2	0	92	6	100
Banilad, Mindoro					
Frequency	0	0	50	0	50
% share	0	0	100	0	100
TOTAL	159	100	137	4	400
(%)	-40	-25	-34	-1	-100

Source: 1989 Forest/Land-use Practices in the Philippines Study (FLUPPS) Survey.

Appendix 7
USE OF FORESTRY EXTENSION (GOVERNMENT) FOR FODDER, BY FARM TREE MANAGEMENT PRACTICES

Use of government Forestry station Frequency (Percent)	System		
	Traditional	Non-traditional	TOTAL
Not use service	77 (94)	19 (66)	96 (86)
Use service	5 (6)	10 (34)	15 (14)
TOTAL	82 (74)	29 (26)	111 (100)

$X^2 = 14.769$, Pr = 0.000
Fisher's exact test (2-tail), Pr = 0.000
Source: 1989 Forest/Land-use Practices in the Philippines Study (FLUPPS) Survey.

Appendix 8
USE OF FORESTRY EXTENSION (GOVERNMENT) FOR FUELWOOD BY FARM TREE MANAGEMENT PRACTICES

Use of Government Forestry Station Frequency (Percent)	System		Total
	Traditional	Non-Traditional	
Not use service	104 (95)	43 (54)	147 (76)
Use service	5 (5)	40 (46)	45 (23)
Total	109 (57)	83 (43)	192 (100)

$X^2 = 49.930$, (Pr = 0.000)
Fisher's exact test (2-tail), (Pr = 0.000)
Source: 1989 Forest/Land-use Practices in the Philippines Study (FLUPPS) Survey.

Appendix 9
USE OF FORESTRY EXTENSION (GOVERNMENT)
FOR CHARCOAL, BY TREE MANAGEMENT PRACTICES

Use of government forestry station Frequency (Percent)	System		
	Traditional	Non-traditional	TOTAL
Not use service	22 -96	11 -92	33 -94
Use service	1 -4	1 -8	2 -6
T O T A L	23 -66	12 -34	35 -100

X^2 = 0.232, (Pr = 0.630) : no difference
Fisher's exact test (2-tail), (Pr = 1.000)

Source: 1989 Forest/Land-use Practices in the Philippines Study (FLUPPS) Survey.

Appendix 10
USE OF FORESTRY EXTENSION (GOVERNMENT) FOR
TREE-BORNE FOODS,BY FARM TREE MANAGEMENT PRACTICES

Use of government forestry station Frequency (Percent)	System		
	Traditional	Non-traditional	TOTAL
Not use service	151 (91)	19 (34)	170 -486
Use service	15 (9)	36 (65)	51 -146
T O T A L	166 -75	55 -25	221 -100

X^2 = 74.077, (Pr = 0.000)
Fisher's exact test (2-tail), (Pr = 0.000)

Source: 1989 Forest/Land-use Practices in the Philippines Study (FLUPPS) Survey.

Appendix 11
USE OF FORESTRY EXTENSION (GOVERNMENT)
FOR HANDICRAFTS, BY FARM TREE MANAGEMENT PRACTICES

Use of government forestry station Frequency (Percent)	System		
	Traditional	Non-traditional	TOTAL
Not use service	13 -100	10 -45	23 -66
Use service	0 0	12 -55	12 -34
T O T A L	13 -37	22 -63	35 -100

X^2 = 10.791, (Pr = 0.001)
Fisher's exact test (2-tail), (Pr = 0.001)

Source: 1989 Forest/Land-use Practices in the Philippines Study (FLUPPS) Survey.

Appendix 12
USE OF AGRICULTURAL EXTENSION FOR
FUELWOOD, BY FARM TREE MANAGEMENT PRACTICES

Use of government agricultural extension Frequency (Percent)	System		
	Traditional	Non-traditional	TOTAL
Not use service	109 -100	75 -90	184 -96
Use service	0 0	8 -10	8 -4
T O T A L	109 -57	83 -43	192 -100

continuity adj. X = 8.682, (Pr = 0.003)
Fisher's exact test (2-tail), (Pr = 0.001)

Source: 1989 Forest/Land-use Practices in the Philippines Study (FLUPPS) Survey.

Appendix 13
USE OF AGRICULTURAL EXTENSION FOR
TREE-BORNE FOODS, BY FARM TREE MANAGEMENT PRACTICES

Use of government agricultural extension Frequency (Percent)	System		
	Traditional	Non-traditional	TOTAL
Not use service	159 -96	50 -91	209 -95
Use service	7 -4	5 -9	12 -5
T O T A L	166 -75	55 -25	221 -100

X^2 = 1.911, (Pr = 0.167)
Fisher's exact test (2-tail), (Pr = 0.178)

Source: 1989 Forest/Land-use Practices in the Philippines Study (FLUPPS) Survey.

Appendix 14
FODDER USE BY FARM SIZE

Use of fodder Frequency (Percent)	Farm-size Category				
	Landless	Small	Medium	Large	TOTAL
Used fodder	13 -42	11 -20	9 -33	98 -45	131 -40
Did not use fodder	18 -58	43 -80	18 -67	121 -55	200 -60
T O T A L	31 -9	54 -16	27 -8	219 -66	331 -100

X^2 = 11.292 (Pr = 0.01)

Source: 1989 Forest/Land-use Practices in the Philippines Study (FLUPPS) Survey.

Appendix 15
TREE PRODUCT USE, BY FARM SIZE

Use of tree product Frequency (Percent)	Farm-size Category				
	Landless	Small	Medium	Large	TOTAL
Used tree product	14 -56	8 -42	5 -38	109 -50	136 -50
Used non-tree product	11 -44	11 -58	8 -62	107 -49	137 -50
T O T A L	25 -9	19 -7	13 -5	216 -79	273 -100

X^2 = 1.541 (Pr = 0.673); no difference across villages

Source: 1989 Forest/Land-use Practices in the Philippines Study (FLUPPS) Survey.

Appendix 16
FUELWOOD USE, BY FARM SIZE

Use of fuelwood Frequency (Percent)	Farm-size Category				
	Landless	Small	Medium	Large	TOTAL
Used fuelwood	18 -51	42 -51	17 -50	118 -49	195 -50
Did not use fuelwood	17 -49	41 -49	17 -50	121 -51	196 -50
T O T A L	35 -9	83 -21	34 -9	239 -61	391 -100

X^2 = .076 (Pr = .995)

Source: 1989 Forest/Land-use Practices in the Philippines Study (FLUPPS) Survey.

Appendix 17
TREE PRODUCT AS PRIMARY FUEL SOURCE, BY FARM SIZE

Tree product use Frequency (Percent)	Farm-size Category				
	Landless	Small	Medium	Large	TOTAL
Used tree product	34 -87	77 -83	34 -85	273 -96	418 -92
Use non-tree product	5 -13	16 -17	6 -15	10 -4	37 -8
T O T A L	39 -9	93 -20	40 -9	283 -62	455 -100

X^2 = 21.93 (Pr = 0.0); 25% of cells have expected counts less than 5.

L.R. X^2 = 21.018 (Pr = 0.0)

Source: 1989 Forest/Land-use Practices in the Philippines Study (FLUPPS) Survey.

Appendix 18
ON-FARM SYSTEM WHERE FUEL IS
PRIMARILY SOURCED, BY FARM SIZE

System Frequency (Percent)	Farm-size Category				
	Landless	Small	Medium	Large	TOTAL
Traditional	18	8	9	73	108
	-95	-73	-82	-49	-57
Non-traditional	1	3	2	76	82
	-5	-27	-18	-51	-43
T O T A L	19	11	11	149	190
	-10	-6	-6	-78	-100

X^2 = 18.792 (Pr = 0.0); 25% of cells have counts less than 5.

L.R. X^2 = 22.172 (Pr = 0.0)

Source: 1989 Forest/Land-use Practices in the Philippines Study (FLUPPS) Survey.

Appendix 19
PRIMARY WOOD SOURCE OF FUELWOOD, BY FARM SIZE

Source of Fuelwood Frequency (Percent)	Farm-size Category				
	Landless	Small	Medium	Large	TOTAL
Government forest	11	23	7	66	107
	-32	-30	-21	-24	-26
Private forest	1	8	4	9	22
	-3	-10	-12	-3	-5
Commercial forest	2	32	12	47	93
	-6	-42	-35	-17	-22
On-farm	19	11	11	149	190
	-56	-14	-32	-55	-45
Purchased	1	3	0	2	6
	-3	-4	0	-1	-1
T O T A L	34	77	34	273	418
	-8	-18	-8	-65	-100

X^2 = 62.107 (Pr = 0.0); 35% of cells have counts less than 5.

L.R. X^2 = 65.1789 (Pr = 0.0)

Source: 1989 Forest/Land-use Practices in the Philippines Study (FLUPPS) Survey.

Appendix 20
CHARCOAL USE, BY FARM-SIZE CATEGORY

Use of Charcoal Frequency (Percent)	Farm-size Category				
	Landless	Small	Medium	Large	TOTAL
Used Charcoal	7	2	3	35	47
	(28)	(4)	(14)	(22)	(19)
Did Not Use Charcoal	18	43	18	121	200
	(72)	(96)	(86)	(78)	(81)
TOTAL	25	45	21	156	247
	(10)	(18)	(9)	(63)	(100)

X^2 = 9.0 (Pr = 0.029); 25% of cells have counts of less than 5.

L.R. x^2 = 11.061 (Pr = 0.011)

Source: 1989 Forest/Land-use Practices in the Philippines Study (FLUPPS) Survey.

Appendix 21
PRIMARY CHARCOAL SOURCE OF FUEL, BY FARM-SIZE CATEGORY

Source Frequency (Percent)	Farm-size Category				
	Landless	Small	Medium	Large	TOTAL
Government Forest	5	0	1	16	22
	(50)	0	(25)	(35)	(35)
Commercial Forest	1	0	0	2	3
	(10)	0	0	(4)	(5)
On-Farm	4	1	3	27	35
	(40)	(50)	(75)	(59)	(56)
Purchased	0	1	0	1	2
	0	(50)	0	(2)	(3)
TOTAL	10	2	4	46	62
	(16)	(3)	(6)	(74)	(100)

X^2 = 17.25 (Pr = 0.045); 81% of cells have counts less than 5.

L.R. x^2 = 8.618 (Pr = 0.473)

Source: 1989 Forest/Land-use Practices in the Philippines Study (FLUPPS) Survey.

Appendix 22
PRIMARY TREE SOURCE OF TIMBER/CONSTRUCTION MATERIALS, BY FARM-SIZE CATEGORY

Source Frequency (in Percent)	Farm-Size Category				
	Landless	Small	Medium	Large	Total
Government forest	3	0	0	13	16
	(100)	0	0	(93)	(89)
Purchased	0	0	1	1	2
	0	0	(100)	(7)	(11)
Total	3	0	1	14	18
	(17)	0	(6)	(78)	(100)

$x^2 = 8.598$ (Pr=0.014); 83 % of cells have expected counts of less than 5.

$L.R.X^2 = 5.353$ (Pr = 0.069)

Source: 1989 Forest/Land-use Practices in the Philippines Study (FLUPPS) Survey.

Appendix 23
PRIMARY TREE SOURCE OF HOUSE CONSTRUCTION MATERIALS, BY FARM-SIZE CATEGORY

Source Frequency (Percent)	Farm-size Category				
	Landless	Small	Medium	Large	TOTAL
Government Forest	1	0	3	46	50
	(11)	0	(18)	(40)	(32)
Private Forest	1	0	0	1	2
	(11)	0	0	(1)	(1)
Commercial Forest	0	0	1	2	3
	0	0	(6)	(2)	(2)
On-Farm	1	2	6	40	49
	(11)	(14)	(35)	(34)	(31)
Purchased	6	12	7	27	52
	(67)	(86)	(41)	(23)	(33)
TOTAL	9	14	17	116	156
	(6)	(9)	(11)	(74)	(100)

$X^2 = 39.378$ (Pr = 0.0); 70% of cells have counts of less than 5.

$L.R.\ X^2 = 37.395$ (Pr = 0.0)

Source: 1989 Forest/Land-use Practices in the Philippines Study (FLUPPS) Survey.

Appendix 24
TREE-BASED HANDICRAFTS PRODUCTION, BY FARM SIZE

Production of Handicraft / Frequency (Percent)	Farm-size Category				
	Landless	Small	Medium	Large	TOTAL
Made handicrafts	1	4	2	47	54
	-5	-9	-28	-28	-21
Did not make handicrafts	18	43	18	121	200
	-95	-91	-90	-72	-79
T O T A L	19	47	20	168	254
	-7	-19	-8	-66	-100

X^2 = 13.51 (Pr = 0.004); 25% of cells have expected counts less than 5.

L.R. X^2 = 15.473 (Pr = 0.001)

Source: 1989 Forest/Land-use Practices in the Philippines Study (FLUPPS) Survey.

Appendix 25

PRIMARY TREE SOURCE OF HANDICRAFT MATERIALS, BY FARMSIZE CATEGORY

SOURCE Frequency (Percent)	FARM SIZE CATEGORY				
	Landless	Small	Medium	Large	TOTAL
Government Forest	0	0	0	23	23
	0	0	0	(40)	(35)
Commercial Forest	0	0	1	0	1
	0	0	(50)	0	(2)
On-Farm	1	4	1	29	35
	(100)	(80)	(50)	(51)	(54)
Purchased	0	1	0	5	6
	0	(20)	0	(9)	(9)
TOTAL	1	5	2	57	65
	(2)	(8)	(3)	(88)	(100)

$X^2 = 36.776$ (Pr = 0.0); 81% of cells have counts less than 5.

L.R. $X^2 = 15.008$ (Pr = 0.091)

Source: 1989 Forest/Land-use Practices in the Philippines Study (FLUPPS) Survey.

Appendix 26
PRIMARY SOURCE OF TREE-BORNE FRUIT/FOOD, BY FARM SIZE

Source Frequency (Percent)	Farm-size Category				
	Landless	Small	Medium	Large	TOTAL
Government Forest	1	0	2	18	21
	(4)	0	(9)	(9)	(7)
Private Forest	0	0	1	3	4
	0	0	(4)	(2)	(1)
Commercial Forest	0	0	2	10	12
	0	0	(9)	(5)	(4)
On-farm	20	41	13	145	219
	(83)	(75)	(57)	(73)	(73)
Purchased	3	14	5	22	44
	(13)	(25)	(22)	(11)	(15)
TOTAL	24	55	23	198	300
	(8)	(18)	(8)	(66)	(100)

X^2 = 21.258 (Pr = 0.047); 60% of cells have counts less than 5.

L.R. X^2 = 27.621 (Pr = 0.006)

Source: 1989 Forest/Land-use Practices in the Philippines (FLUPPS) Survey.

Appendix 27
ON-FARM SYSTEM WHERE TREE-BORNE FOOD IS PRIMARILY SOURCED, BY FARM-SIZE CATEGORY

System Frequency (Percent)	Farm-size Category				
	Landless	Small	Medium	Large	TOTAL
Traditional	19	39	12	95	165
	(95)	(95)	(92)	(66)	(75)
Non- traditional	1	2	1	50	54
	(5)	(5)	(8)	(34)	(25)
TOTAL	20	41	13	145	219
	(9)	(19)	(6)	(66)	(100)

X^2 = 22.343 (Pr = 0.0); 25% of cells have counts less than 5.

L.R. X^2 = 26.853 (Pr = 0.0)

Source: 1989 Forest/Land-use Practices in the Philippines Study (FLUPPS) Survey.

Appendix 28
CODE AND COMMON ENGLISH NAME OF SPECIES

Code	Species	Common English Name
ALBIFA	Albizia falcataria (Paraserianthes falcataria)	Moluccan sau
ALNUMA	Alnus Maritima	
ALSTMA	Alstonia macrophylla	
ARTOHE	Artocarpus heterophyllus	jackfruit
BAMBSP	Bambusa spp.	
CHRYCA	Chrysophyllum cainito	
CINNME	Cinnamomum mercadoi	
CITRMI	Citrus microcarpa	
CITRNO	Citrus nobilis	
CLEIOP	Cleistocalyx opercalatus	
COCONU	Cocos nucifera	coconut
COFFAR	Coffea arabica	coffee
DIPTGR	Dipterocarpus grandiflorus	
GLIRSE	Gliricidia sepium	madre de cacao
LANSDO	Lansium domesticum	langsat
LEUCLE	Leucaena leucocephala	leucaena
MANGIN	Mangifera indica	mango
MUSASA	Musa sapientum	banana
MUSSPH	Mussaenda philippica	
PASPCO	Paspalum conjugatum	
PENTCO	Pentacme concorta	
PERSAM	Persea americana	avocado
PINUKE	Pinus kesiya	
PSIDGU	Psidium guajava	guava
SANDIO	Sandoricum koetjape	
SHORAS	Shorea astylosa	
SHORNE	Shorea negrosensis	
SHORPO	Shorea polysperma	
SHORSP	Shorea spp.	
SYZYCU	Syzygium cumini	
THEOCA	Theobroma cacao	
TRISDE	Tristania decorticata	
VITEPA	Vitex parviflora	molave

Source: 1989 Forest/Land-use Practices in the Philippines Study (FLUPPS) Survey.

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