

# SOCIO-ECONOMIC FACTORS AFFECTING SMALLHOLDER TREE PLANTING AND MANAGEMENT INTENTIONS IN LEYTE PROVINCE, THE PHILIPPINES<sup>1</sup>

Nick F. Emtage and Jungho Suh

---

Survey data have been collected from four rural communities in Leyte Province, the Philippines, on household tree planting and management intentions, as well as the socio-economic characteristics, attitudes to tree planting and management, farming practices and the number of trees planted. In relation to intended tree planting and management activities, respondents were asked a series of structured questions as to what tree species they intend to plant, how many individual trees of each of those species they plan to plant, and for what purpose they propose to plant each of the tree species. This paper reports the results of analyses of the stated tree management intentions of households in the four communities and identifies the socio-economic factors that influence householders' tree management intentions. Respondents were generally enthusiastic about the possibility for further tree planting on their land, 75% indicating they would undertake planting. About 60% indicated an interest in commercial tree farming, with no significant differences in this level of interest between communities. It was found that a number of socio-economic variables indicating higher levels of land ownership and previous experience in the forestry industry are related to the intention to plant trees to produce timber for sale. These include the use of materials from public lands, participation in community organisations and community forestry programs, and the present management of trees to produce timber for sale.

---

## INTRODUCTION

Severe deforestation took place in the Philippines during 1960 to 1990, with wholesale logging by concessionaires converting primary forest into secondary forest (Kummer 1992). Concessionaires had little incentive to replant; moving on to another concession area was inexpensive and easy. Logging roads from abandoned concessions opened the residual forests to landless lowland farmers, who further degraded secondary forestlands with the spread of agriculture (Johnson 1999). The rapid deforestation over the three decades changed the Philippines from one of the world's largest log producers and exporters to a net timber importer (Harrison *et al.* 2001).

In 1995, the Philippine Department of Environment and Natural Resources (DENR) formally established the Community-based Forest Management (CBFM) program to ensure the sustainable development of Philippine forest resources, recognising that approximately 16 million people living in the uplands are in the best position to manage the forests (Harrison *et al.* 2001). The program was designed to provide 25-year tenure, renewable for another 25 years, over blocks of forestland to communities organised into People's Organisations.<sup>2</sup> The DENR still manages the forestlands on behalf of the State, but secure tenure gives communities a stake in occupying, protecting, rehabilitating, managing, developing and utilising their surrounding forest resources. It was hoped that the CBFM Program would stimulate smallholders to plant and manage trees on their own land as well as the areas

---

<sup>1</sup> This paper was published in *Small-scale Forest Economics, Management and Policy*, 3(2): 257-270.

<sup>2</sup> CBFM is a consolidation of previously existing government forestry support programs.

covered by the agreements. Data about the success of the planting efforts undertaken under the CBFM program are difficult to obtain (UNFAO and FMBDENR 2003), and little information is available about the present and intended tree management activities of smallholders on land managed by them in upland areas.

The Australian Centre for International Agricultural Research (ACIAR) smallholder forestry project *Redevelopment of a Timber Industry Following Extensive Land Clearing* commenced in 2001 in order to examine measures to promote non-industrial forestry development in the Philippines. As part of the project, a survey was undertaken in four communities in Leyte Province. The survey was designed to obtain a range of data on forestry activities of the households, including the socio-economic characteristics, farming practices, present and future tree planting, and attitudes to tree planting and management.

This paper reports survey findings on tree planting and management intentions of smallholders on the land they manage themselves in the communities in Leyte Province.<sup>3</sup> In particular, the paper identifies the relationship between tree planting and management intentions and a range of household socio-economic characteristics. This information is designed to assist regional policy makers to target forest policy goals more efficiently and closely.

It should be mentioned that the survey concerned tree management on land managed by individual households rather than by the community organisations. However, respondents were asked whether they had ever been a member of a community organisation and whether they had ever participated in a community forestry program. Involvement in community organisations was then used as a control to determine whether tree planting intentions of individual households are related to such present or prior involvement.

In the next section of the paper, a brief outline of the research method is provided, followed by description of the socio-demographic backgrounds of the respondents. Tree species which respondents intend to plant are then reported. Purposes of tree planting in future are then examined. Next, the relationships between summary variables of households' tree management intentions and the socio-economic characteristics of households are presented. Finally, the main findings from the survey analyses are reported and concluding comments provided.

## RESEARCH METHOD

In the ACIAR smallholder forestry project, a total of 203 respondents were randomly selected from the list of households provided by the barangay council in each of four barangays, namely Tigbao, Conalum, Poting Bato and Rizal II.<sup>4</sup> Fifty or more households were interviewed in each of the communities by a team of enumerators, in the local language dialects of Cebuano or Waray Waray. Topics covered by the survey included present and intended tree planting and management, sources of planting stock, options available on the choice of species, and sources of advice related to tree planting and management.

---

<sup>3</sup> The expression 'tree planting and management' is used here to signify that some of the trees managed by households are natural vegetation regeneration rather than having been planted by the household. The term 'smallholder' is used as synonymous with 'household' in this paper, because the households involved in the survey were all smallholders, who manage small areas of farming land. Land which is 'managed' by the smallholders involves various form of tenure, including leased land.

<sup>4</sup> A barangay is the smallest local government unit in the Philippines. Municipalities and cities are composed of barangays. Each barangay is headed by a barangay captain (*punong barangay*) who leads the barangay council.

The data were processed through the Statistical Package for the Social Sciences (SPSS) program. Frequencies, cross-tabulations and other appropriate statistical analyses were conducted to gain insights into the relationships between socio-economic variables and those variables related to tree planting intentions. All the socio-economic variables were initially considered for testing of possible relationships with household tree planting intention, the number of trees intended to be planted and household interest in commercial tree farming in the future. Subsequently, some variables were selected on grounds of statistical significance. This paper then presents the results where significant relationships have been identified.

Continuous data were examined to assess the need for transformation prior to undertaking analysis of variance (ANOVA) tests. The measures of household income, remittances, land size and distance to farm plots were found to be highly skewed and therefore they were transformed using natural logarithm functions. The transformed data were used in regression, chi-square analysis and one-way ANOVA tests where appropriate. Unless otherwise indicated, however, the results displayed in descriptive tables of this paper are based on the untransformed data.<sup>5</sup>

## **SOCIO-ECONOMIC CHARACTERISTICS OF THE RURAL COMMUNITIES SURVEYED IN LEYTE PROVINCE**

Substantial differences were found between the four communities in terms of socio-economic circumstances of households. In part, this is due to the location and road access of the communities, land topography, and proximity to the coast, large towns and major roads. Tigbao and Poting Bato are located in the mountainous or 'upland' area of Leyte Province and have low-quality unsealed roads servicing their communities. On the other hand, Conalum and Rizal II are located on the coastal plain of Leyte Province and accessed by sealed national highways.

The average family size across all four communities was found to be five persons. In terms of highest level of formal education, slightly over half the households surveyed have at least one member with high school education, one quarter completed only elementary school education and 15% finished tertiary education.

One-way analysis of variance tests revealed differences in average gross yearly household income between communities (d.f. = 3,  $F = 2.724$ ,  $p = 0.045$ ). Multiple comparison tests (Bonferroni method) indicated that households in Poting Bato have lower average gross yearly income than those in the other communities. Substantial income variability exists within communities as well as between them, as expressed to their coefficients of variation (Table 1).

It was reported that the average annual family incomes of Leyte Province in 1994 and 2000 were PHP51,042 and PHP93,251, respectively (National Statistical Coordination Board 2001). The annual per capita poverty threshold as of year 2000 for rural areas in Leyte Province was PHP9,725 with the poverty rate being 47.6%. This implies that nearly half the people in rural areas of the province can be considered as poor. As indicated by the median per capita incomes in Table 1, a large portion of the households in each of the surveyed communities fall below the official poverty threshold.

It was found that respondents on average derive approximately 40% of their income from farming, including fishing in the case of some Conalum residents. A higher proportion of

---

<sup>5</sup> The research methodology is explained in more detail, and findings from other aspects of the survey are presented, in Emtage (2004).

income from farming (46%) was reported by Tigbao respondents, although this was not statistically significant.

**Table 1.** Measures of location and dispersion of mean household gross yearly income in the four communities (Philippine pesos (PHP))<sup>a</sup>

Community	Number of observations	Mean household income	Median household income	Coefficient of variation (%) <sup>b</sup>	Median per capita income
Conalum	52	58,458	42,380	94	7,723
Poting Bato	51	32,883	21,400	96	4,380
Rizal II	50	57,331	41,110	96	9,158
Tigbao	50	57,403	34,585	117	7,099
All respondents	203	51,496	36,400	106	7,091

<sup>a</sup> The exchange rate is approximately US\$1 = PHP50.

<sup>b</sup> The coefficient of variation is the ratio of the standard deviation over the mean, expressed as a percentage.

## SIZE OF LAND AND NUMBER OF TREES CURRENTLY BEING MANAGED

The total size of farmland where the sample households are growing crops and trees amounts to 570 ha. Most respondents reported that they have planted, or are currently managing trees that have naturally regenerated, on the land they control, although 39 households (21%) are not growing any trees. As indicated in Table 2, on average each household is managing 2.91 ha of farming land, and owns 1.44 ha of this land. Notably, the households of Poting Bato are managing or own smaller land areas than those in the other communities.

**Table 2.** Average land size managed or owned by the households in the four communities

Land type	Community	Number of observations	Mean	Coefficient of variance (%) <sup>a</sup>	Median
Size of all land managed per household (ha)	Conalum	52	2.36	118	1.38
	Poting bato	45	2.18	137	1.00
	Rizal II	49	4.71	148	3.00
	Tigbao	50	2.38	78	2.25
	All respondents	196	2.91	145	
Size of own land per household (ha)	Conalum	52	1.35	191	0.50
	Poting Bato	51	0.61	232	0.00
	Rizal II	50	2.40	240	0.75
	Tigbao	50	1.42	128	1.00
	All respondents	203	1.44	234	

<sup>a</sup> The coefficient of variation is the ratio of the standard deviation over the mean, expressed as a percentage

As indicated in Table 3, the household residences are not situated in the fields, but in small communities. The average aggregate distance from the dwellings to all of their farming parcels is about 3.2 km, with an average of 1.7 km to each parcel. Those in Poting Bato

have the least distance to travel, probably due to the lack of available land, while those in Rizal II have to travel the furthest on average to their plots. The large total distance travelled by Tigbao households to their plots reflects that they have access to a greater number of farm parcels.

Across the farming lands in the survey sites, a total of 51,332 planted or natural trees are currently being managed, for which a total of 88 distinct species have been identified. It is notable that despite the species diversity, 10 species account for 83.2% of the total number of individual stems; these species include mahogany, ipil-ipil, gmelina and molave (Cedamon *et al.* 2004).

**Table 3.** Mean aggregate and average distances to farm plots by communities

Aggregate or average	Community	Number of observations	Mean	Standard error
Aggregate distance to farm plots	Conalum	52	2.81	0.351
	Poting Bato	51	1.16	0.229
	Rizal II	50	4.00	0.667
	Tigbao	50	5.03	1.292
	Average	203	3.24	0.384
Average distance to individual farm plots	Conalum	52	1.32	0.167
	Poting Bato	45	0.70	0.126
	Rizal II	49	2.66	0.408
	Tigbao	50	1.99	0.557
	Average	196	1.68	0.189

## TREE SPECIES INTENDED FOR PLANTING

Respondents were asked to name up to nine different tree species they intend to plant on their land. Only 27 distinct tree species choices were reported. Respondents were generally enthusiastic about the possibility for further tree planting on their land, with 78% households indicating they would undertake planting. In total, 159 households intend to plant 37,241 trees in the future. Among 159, however, 53 households did not specify the number of trees they would establish. Also, some respondents who indicated the number of stems did not provide species names. The statistical analysis has been confined to the 95 households which specified the number of stems for one or more distinct tree species they would establish, with the total number of trees intended for planting reduced to 30,327 as presented in Table 4.

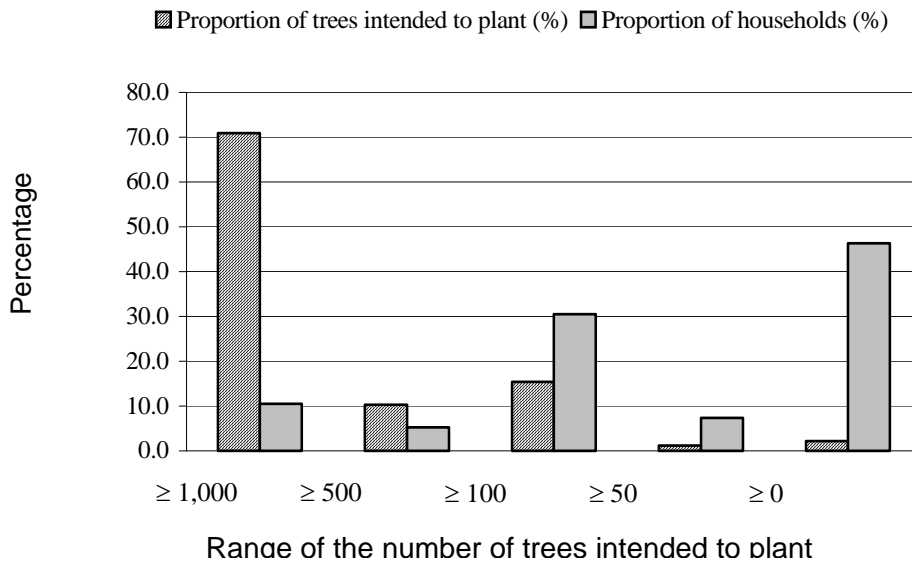
The intended species are dominated by mahogany and gmelina. In this respect, the preferred timber species are similar to current practice – mahogany and gmelina are the most common species currently being planted throughout the forestlands in the Philippines (Carandang *et al.* 2002, Mangaoang and Pasa 2003).

It is notable that a small portion of households intend to plant a high proportion of all the trees reported, as illustrated in Figure 1. Just 10.5% out of the 95 households account for 70.9% of the total number of trees intended for planting across the four communities. Each of these households intend to plant at least 1000 trees. On the other hand, 46.3% of households intend to plant less than 50 trees on their land in the future, accounting for only 2.2% of all the trees reported. To predict growers' preferences for tree species in the future, the 27 species were classified into five categories as presented in Table 5. The classification adopted here follows the perception of local community people. High-valued species are used for building construction, furniture, poles and piles, while non-high-valued species are used mainly for firewood, charcoal and light-fencing. As indicated in the table,

most species the respondents intend to plant are classified as high-valued timber species or fruit trees.

**Table 4.** Number of trees proposed for planting

Species name	Number of households	Number of stems	Distribution ratio (%)
Mahogany ( <i>Swietenia macrophylla</i> )	49	10,520	34.7
Gmelina ( <i>Gmelina arborea</i> )	33	8,989	29.6
Mangium ( <i>Acacia mangium</i> )	19	4,533	14.9
Bagras ( <i>Eucalyptus deglupta</i> )	15	1,909	6.3
Mango ( <i>Mangifera indica</i> )	15	1,647	5.4
Ipil-ipil ( <i>Leucaena leucocephala</i> )	2	1,025	3.4
Molave ( <i>Vitex parviflora</i> )	12	285	0.9
Lanzones ( <i>Lansium domesticum</i> )	6	205	0.7
Jackfruit ( <i>Artocarpus heterophyllus</i> )	4	180	0.6
Narra ( <i>Pterocarpus indicus</i> )	7	161	0.5
Others	18	873	2.9
Total	95	30,327	100.0



**Figure 1.** Distribution of the number of trees intended for planting across households

To predict growers' preferences for tree species in the future, the 27 species were classified into five categories as presented in Table 5. The classification adopted here follows the perception of local community people. High-valued species are used for building construction, furniture, poles and piles, while non-high-valued species are used mainly for firewood, charcoal and light-fencing. As indicated in the table, most species the respondents intend to plant are classified as high-valued timber species or fruit trees.

Table 6 reports the number of trees of each species category to be planted in the future in total across the respondents. The most preferred species category was found to be the non-native high-valued timber species. These species might be preferred due to the direct availability of their seedlings (Gregorio *et al.* in process) or their shorter rotation period as compared to native high-valued species. On the other hand, it is obvious that the respondents had little interest in planting non-high-valued species, native or non-native. It is

worth noting that there are 45 native non-high-valued tree species including Kakawate (*Gliricidia sepium*), Balete (*Ficus balete*) and Tibig (*Fucus nota*) which are currently being managed by the respondents (Cedamon 2004). Presumably, these native non-high-valued trees might have naturally regenerated and been managed by the respondents, but they have no intention to plant these species in the future.

**Table 5.** Classification of tree species intended for planting

Species group	Individual species
Native high-valued species	Bagras, molave, narra, bagalunga ( <i>Melia dubia</i> ), lauan ( <i>Shorea spp.</i> ), yakal ( <i>Hopea astylosa</i> ), mabolo ( <i>Diospyros discolor</i> )
Non-native high-valued species	Gmelina, mahogany, ipil-ipil, mangium, falcata ( <i>Paraserianthes falcataria</i> ), acacia ( <i>Samanea saman</i> )
Native non-high-valued species	Anislag ( <i>Securrinega flexousa</i> )
Non-native, non-high-valued species	No species identified
Fruit trees	Sunkist ( <i>Thuja occidentalis</i> ), avocado ( <i>Persia Americana</i> ), guyabano ( <i>Anona muricata</i> ), marang ( <i>Artocarpus odoratissimus</i> ), santol ( <i>Sandoricum koetjape</i> ), jackfruit, star apple ( <i>Chrysophyllum oliviforme</i> ), mango, rambutan ( <i>Nephelium lappaceum</i> ), lanzones, durian ( <i>Durio zibethinus</i> ), kalamansi ( <i>Citrus mitis Blanco</i> ), tambis ( <i>Syzygium aqueum</i> )

**Table 6.** Number of trees to be planted, by various categories

Tree species category	Number of households	Number of stems	Component ratio (%)
Native high-valued species	32	2,500	8.2
Non-native high-valued species	75	25,137	82.9
Native non-high-valued species	1	50	0.2
Non-native, non-high-valued species	0	0	0.0
Fruit trees	20	2,640	8.7
Total	95	30,327	100

## PURPOSES OF FUTURE TREE PLANTING

Respondents were asked to indicate the intended purposes of their tree planting for each of the species they plan to grow in future. For each tree species to be planted, respondents were allowed to name multiple purposes. Unfortunately, most respondents were unable to indicate the number of trees in each species which they intent to plant for each of the purpose category. It is safe to state, however, that the respondents who intend to plant high-valued tree species are most likely to aim to produce timber for building construction and furniture making, for own use or sale, with other purposes (including soil protection, shade for crops or next generation) of marginal priority.

Fifty-one households indicated that they intend to plant trees to produce timber for sale. To estimate the maximum number of individuals trees (or stems) of each timber species which

will be grown to be sold, all individual trees of each species were considered to be grown for commercial benefits if 'sale' was reported as one of the intended purposes for the particular species. As reported in Table 7, the maximum possible individuals of high-valued timber trees to be harvested for sale is estimated to reach 70.5% and 64.7% of native species and non-native species to be planted, respectively.<sup>6</sup>

**Table 7.** Proposed tree planting for sale, by various categories

Classification	Total number of stems	Number to be grown for sale	Fraction grown for sale (%)
Native high-valued species	2,500	1,763	70.5
Non-native high-valued species	25,137	16,273	64.7
Native non-high-valued species	50	0	0.0
Non-native, non-high-valued species	0	0	0.0
Fruit trees	2,640	20	0.8
Total	30,327	18,056	59.5

## **SOCIO-ECONOMIC FACTORS RELATED TO HOUSEHOLD TREE PLANTING AND MANAGEMENT INTENTIONS**

A clear understanding of the intended tree planting activities of households is required to estimate the likely impact of forestry development programs on various types of households. To this end, this section analyses the relationships between the variables constructed to summarise household tree planting and management intentions and those relating to the socio-economic characteristics of the households.

### **Relationships between Household Tree Planting Intention and Socio-economic Variables**

In general, those households that intend to plant trees on land they own or manage have higher levels of resources, are currently more active in terms of their present tree management and have higher awareness of tree regulations than households that do not intend to plant trees in the future. These findings are consistent with results of statistical tests between the socio-economic characteristics of households and their current tree management activities (Emtage 2004).

Table 8 reports the proportion of households which intend to plant trees across various discrete socio-economic variables.<sup>7</sup> Those which intend to plant trees are more likely to know how to register the trees with the DENR so as to obtain approval to harvest. They are also more likely to have used materials from public lands in the past. Those households currently managing some trees and those currently growing timber for sale are more likely to be considering planting more trees in the future than the households not presently managing any trees. Those households which perceive they own at least some of the land they use for farming are more likely to be planning to establish trees in the future. Finally, households which intend to plant trees in the future are more likely to have participated in a community organisation.

<sup>6</sup> The calculation of the numbers of trees respondents expect to sell was complicated by missing data, with 12 of these respondents failing to specify the number of trees they would establish, and 15 failing to specify the proportion of the species in question they would sell.

<sup>7</sup> The relationships between household tree planting intention and some continuous variables are reported in Table 11.



**Table 8.** Cross-tabulation of various categories of household socio-economic variables with intentions to manage trees in the future

Variable	$\chi^2$ value	Probability	Category	Intention to plant trees (%)		
				No	Yes	All respondents
Interested in commercial tree farming	47.841	0.000	No	82	26	39
			Yes	18	74	61
If ever been member of a community organisation	14.379	0.000	No	73	41	48
			Yes	27	59	52
If presently growing timber for sale	7.211	0.007	No	100	87	90
			Yes	0	13	10
If presently manage trees	5.882	0.015	No	33	17	21
			Yes	67	83	80
If have own land	5.694	0.017	No	57	38	43
			Yes	43	62	58
Know how to register trees	3.811	0.051	No	92	80	83
			Yes	8	20	17
Used resources from public land in the past	2.999	0.083	No	70	59	62
			Yes	30	41	38

Note: Each  $\chi^2$  test of independence has one degree of freedom.

### Relationships between Total Number of Trees Intended for Planting and Socio-economic Variables

Tests of relationships between the variable 'total number of trees intended to be planted by the household' and some discrete socio-economic variables reveal a number of significant relationships as reported in Table 9. Those households that have their own transport and those that have been involved with community organisations are planning to plant more trees than the others. Those households which manage some land which they own intend to plant more trees than those who do not. As expected, those households which are interested in commercial tree farming in the future intend to plant more trees than the others. The land size of the household is positively correlated with the number of trees individual households intend to plant, as is the number of farming plots managed by the household and their cash income (Table 11).

**Table 9.** Total number of trees intended to be planted across various socio-economic variables

Socio-economic variable	<i>F</i> -statistic	Probability	Category	Number of observations	Mean number of trees	Standard deviation
If have own transport?	4.170	0.042	No	167	143	463.1
			Yes	36	372	1064.9
			Total	203	183	616.8
Interested in commercial tree farming	6.396	0.012	No	78	48	138.5
			Yes	123	272	773.1
			Total	201	185	619.6
If household has been a community organisation member	4.752	0.000	No	98	89	510.3
			Yes	102	279	701.5
			Total	200	186	621.1
If have own land?	3.785	0.053	No	87	87	271.1
			Yes	116	256	775.3
			Total	203	183	616.8

Note: The *F*-statistic in ANOVAs has one degree of freedom for error.

### Relationships between Interest in Commercial Tree Farming in Future and Socio-economic Variables

Respondents were directly asked if they had an interest in commercial tree farming. Approximately 60% replied in the affirmative, with no significant differences between communities. Interest in tree farming was strongly related to size of landholding, control of more than one farming plot and involvement with community organisations (Table 10).

The households with an interest in commercial tree farming differed from those with no interest in terms of the proportion and area of land owned, total and average distance to their farming plots, and number of trees they are presently growing that they plan to sell. Those with an interest in commercial tree farming were found to own more land and to own a greater proportion of the land they manage. They also manage land further away from their dwelling, and control a greater number of farming plots.

A number of statistically significant relationships were identified between income and asset variables and variables indicating household intention to plant trees, as summarised in Table 11. Those who intend to plant trees in the future have greater levels of household wealth in terms of access to and ownership of land, and greater levels of household income and education of the household. These future tree growers are largely overlapping with those who are presently managing trees on their land. They are also more likely to have experience in forestry activities, having participated in community forestry programs, and be presently utilising resources on public forest land.

**Table 10.** Proportional distribution of households which are interested in commercial tree farming across various socio-economic variables

Socio-economic variable	$\chi^2$ value	Probability	Category	Interest in commercial tree farming (%)	
				No	Yes
Used resources from public land in the past	16.317	0.000	No	51	49
			Yes	22	78
			All respondents	40	60
If ever been member of a community organisation	12.177	0.000	No	51	49
			Yes	26	74
			All respondents	38	62
If use materials from public lands	10.187	0.001	No	45	55
			Yes	20	80
			All respondents	38	62
If participated in community forestry program	9.065	0.003	No	47	53
			Yes	25	75
			All respondents	39	61
Presently growing timber for sale	7.761	0.005	No	42	58
			Yes	10	90
			All respondents	39	61
Know how to register trees	5.647	0.017	No	41	59
			Yes	19	81
			All respondents	37	63
If household member has done any community forestry training	2.992	0.084	No	43	57
			Yes	30	70
			All respondents	39	61

Note: Each  $\chi^2$  test of independence has one degree of freedom.

Thus, it can be said that that community forestry programs can to some extent address the severe deforestation and consequent environmental and economic difficulties in parts of Leyte Province. It is notable that the distance to the farming parcels of a household is positively correlated with the number of trees that the household plans to establish. This suggests that tree planting is perceived as a less demanding activity appropriate for farming parcels that are further away from their dwellings.

**Table 11.** Summary of interactions between variables relating to intended tree planting behaviour and continuous variables

Variable	Intention to plant trees	Number of trees to be planted	Number of trees to be harvested for sale
Total household income	+		+
Land size	+	+	
Trees presently managing	+	+	
Number of farming plots used	+	+	
Distance to farming plots	+	+	
Proportion of farm land owned	+		+
Size of own land	+	+	

Note: '+' indicates a positive correlation between the variables at the 5% significance level.

## CONCLUDING COMMENTS

The majority of landholders proposed to plant high-valued timber trees and fruit trees, the primary purpose being to meet their own household needs for timber for house construction materials and fruit for household consumption, respectively. It is hardly surprising that high-valued species are preferred, gmelina and mahogany in particular, where householders intend to plant trees for commercial purposes. The final end users of high-valued timbers to be sold are expected to be the construction or furniture manufacturing industries. This indicates that if there is a steady increase in the market demand for high-valued timbers, then landholders can be encouraged to plant trees.

While it was found that the level of household resources in terms of their cash income, land area managed and land ownership are related to smallholders' interest in tree planting and management in the future, no significant differences were observed between the four communities, in terms of tree planting intentions, number of trees they intend to plant or purposes for which they intend to grow trees. This finding calls for attention, given that the tests for differences between communities in terms of average annual gross income, land size managed and land ownership revealed that households have lower resources in Poting Bato than in the other communities. This result can partly be attributed to the fact that low-income households in the other communities were also involved in the community survey. In other words, the result can be construed as meaning that future tree planting and management activities can be more influenced by household circumstances rather than community circumstances.

It should be noted that respondents were often non-specific when they were asked how many trees of what species they intend to plant and what proportion of the future tree planted they intend to sell for commercial benefits, although most exhibited positive attitudes towards future tree planting in general terms. This data limitation may reinforce a position that future tree planting intentions are not necessarily a strong indicator of future behaviour. Rather, given the levels of poverty in rural areas of Leyte Province, the findings from the tests for socio-economic differences between landholders having and not having intentions to grow trees and their present tree management activities, help to explain the current lack of forestry activity in Leyte Province.

## REFERENCES

- Carandang, M.G., Calderon, M.M., Carandang, A.P. and Iglesia, N.T. (2002), Assessment of Status and Prospects: Private Land Tree Plantations in the Philippines, unpublished paper, Quezon.
- Cedamon, E.D., Emtage, N.F., Suh, J., Herbohn, J.L., Harrison, S.R. and Mangaoang, E.O. (2004), 'Present tree planting and management activities in four rural communities in Leyte Province', a paper presented at the ACIAR end-of-project workshop held 19-21 August 2004, Ormoc.
- Emtage N.F. (2004), An Investigation of the Social and Economic Factors Affecting the Development of Small-scale Forestry by Rural Households in Leyte Province, the Philippines, unpublished PhD thesis, School of Natural and Rural Systems Management, The University of Queensland, Gatton, Australia.
- Gregorio, N., Herbohn, J.L. and Harrison, S.R., 'Small-scale forestry development in Leyte Province, the Philippines: the central role of nurseries', *Small-scale Forest Economics, Management and Policy*, 3(3): 337-351.
- Harrison, S.R., Ghose, A.S. and Herbohn, J.L. (2001), 'Lessons from social and community forestry in the tropics, with particular reference to India and the Philippines', in S.R. Harrison and J.L. Herbohn (eds), *Sustainable Farm Forestry in the Tropics: Social and Economic Analysis Policy*, Edward Elgar, Cheltenham, pp. 227-240.
- Johnson, T.R. (1999), 'Community-based forest management in the Philippines', *Journal of Forestry*, 97(11): 26-30.
- Kummer, D.M. (1992), *Deforestation in the Postwar Philippines*, University of Chicago Press, Chicago.
- Mangaoang, E.O. and Pasa, A.E. (2003), 'Preferred native tree species for smallholder forestry in Leyte', *Annals of Tropical Research*, 25(1): 25-30.
- National Statistical Coordination Board (2001), *Regional Social and Economic Trends 2001*, National Statistical Coordination Board Regional Unit 8, Tacloban.
- UNFAO and FMBDENR (2003), *Sustainable Forest Management, Poverty Alleviation and Food Security in Upland Communities in the Philippines: Revised Master Plan for Forestry*, UNFAO Project PHI/01/010 Final Draft Report, DENR, Quezon, <http://forestry.denr.gov.ph/MPFD.htm>, accessed 26/2/2004.

