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Present Tree Planting and Management Activities in Four Rural Communities in Leyte Province, the Philippines

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ABSTRACT

Demand for timber in Leyte Province continues to increase whilst supplies from domestic sources have contracted following suspension of logging in remaining natural forests. One approach to meet the deficit in timber supplies has been to encourage timber planting by smallholders. A survey was undertaken in four rural communities to help assess present tree planting and management activities of households and their tree planting and management intentions. It was found out that not more than 100 trees are managed by each of about 61% of the households who have planted trees. There were 88 different species planted or managed by households, but 83% of the total trees planted belong to only 10 species, including mahogany, ipil-ipil, gmelina and molave. The primary purpose of tree planting is to meet household needs for timber for dwelling construction and fruit production. About 72% of the total trees being managed by households were planted, as distinct from natural regeneration, with planting stock coming mostly from own seeds, nursery and wildlings. Only four respondents had registered any of their trees with the Department of Natural Resources and Environment (necessary for commercial harvesting), the main reason for lack of registration appearing to be lack of awareness of this procedure.

Keywords: smallholder farmers, household survey, number of trees planted, species choice, on-farm timber use, tree registration.

INTRODUCTION

Demand for timber in Leyte Province continues to increase while supplies from domestic sources have contracted following the suspension of logging in remaining natural forests. The lack of tree cover across the Philippines, including in Leyte, continues to cause soil degradation, leads to the degradation of water resources and leaves areas vulnerable to a repeat of the mudslides and flooding that have caused severe loss of life in the past.

Given the high population density, high rates of rural poverty in Leyte Province and the strict implementation of DENR policies against illegal cutting of timbers in natural forests, encouraging timber planting by smallholders appears to be the most practical way to make up the deficit in timber supplies and also provide an additional source of income to rural households as well as environmental benefits. Small-scale forestry or farm forestry has no distinct definition (Harrison *et al*., 2002) but in the Leyte (Philippines) context a workable definition is that smallholder or small-scale farmers are resource-constrained farmers. These farmers have historically planted trees on their farms to cater for household demand for timber for both light construction and fuelwood. Intensification of small-scale tree farming activity is expected to boost wood production both in existing forests and from new plantations (Aggangan, 2001).

A survey of households' present and intended tree planting and management activities was undertaken in four communities in Leyte. The first section of this paper describes the study area and communities covered by the survey. A brief discussion of the data collection method is then provided, followed by a description of the households involved in the survey. Survey findings on tree planting and management activities of households are next presented. This section covers topics on the proportion of households planting and managing trees, number of trees planted, number of trees intended for harvest and for sale, and perceived functions of trees on farms. A brief section on the sources of planting advice and planting stock is provided to reinforce the information presented in the tree planting and management section. The awareness and behaviour of households in tree registration is then discussed. Finally, important findings and implications to promotion, development, and improvement of small-scale tree farming in Leyte are discussed.

THE STUDY AREA AND RESEARCH METHOD

Leyte Province is one of the two provinces on Leyte Island, which forms Region 8 of the Republic of the Philippines. The province has a land area of 571,208 ha (Groetschel *et al*. 2001) of which 381,094 ha is alienable and disposal (A&D) land and the balance is forest land. Leyte Province has 1.59 M inhabitants with an approximate growth rate of 1.13% per year (National Statistical Coordination Board, Region 8, 2001). The population density of 2.78 persons per ha for Leyte Province (including 4.17/ha for A&D land) exceeds that of 1.73/ha for Region 8. The average annual family income of the province in 1994 and 2000 were PhP51,042 and PhP93,251 respectively (National Statistical Coordination Board, Region 8, 2001). The annual per capita poverty threshold of rural areas in Leyte as of year 2000 is PhP9,725 and the

poverty rate 47.6% (Table 1), indicating that nearly half of the people in rural areas fall below the poverty line (National Statistical Coordination Board, 2001). As of November 1994, the simple literacy rate of household population 10 years old and above was 90.55% (National Statistical Coordination Board, 2001).

A household survey was conducted in four communities in Leyte Province. The survey was part of a larger study which examined a broad range of topics, including the socio-economic characteristics of the communities and households, their development priorities, attitudes to tree planting and management, and their farming practices. Methodology and findings from the wider survey have been reported by Emtage (2004).

Table 1. Poverty threshold, poverty rates and population density of rural and urban areas in Leyte Province, 2000

Locality	Annual per capita poverty threshold (PhP[1])	Number of poor families	Proportion of families which are poor (%)
Region 8	9,969	40,661	19.6
Leyte Rural	9,725	108,093	47.6
Leyte Urban	10,250	13,977	12.6

The four communities chosen for the study were the barangays of Rizal II in Babatngon Municipality, Poting Bato in Isabel, Conalum in Inopacan and Tigbao in Matalom (Figure 1). These communities are – or have been – involved in various forestry programs and projects implemented by the Department of Environment and Natural Resources (DENR). Three of the communities are located in western Leyte where people speak the *Cebuano* dialect and the fourth is in the north-east and is dominated by *Waray Waray* speaking people. Two communities – Poting Bato and Tigbao – are located in the upland areas situated along the north-south mountain ranges of Leyte Island. Both of these communities have electricity, but access is via unsealed roads that become treacherous during heavy rains. The other two communities are located on the coastal plain and are served by roads that were concreted only in the last three years.

A target sample size of 40 households from each of the four barangay was chosen, as a trade-off between data reliability and cost. A common questionnaire was developed and tested, and an interview team recruited and trained. Sample households were randomly selected from lists provided by barangay councils in each community, a total of 203 usable questionnaires being obtained.

[1] US$1 = 50 PhP, approximately.

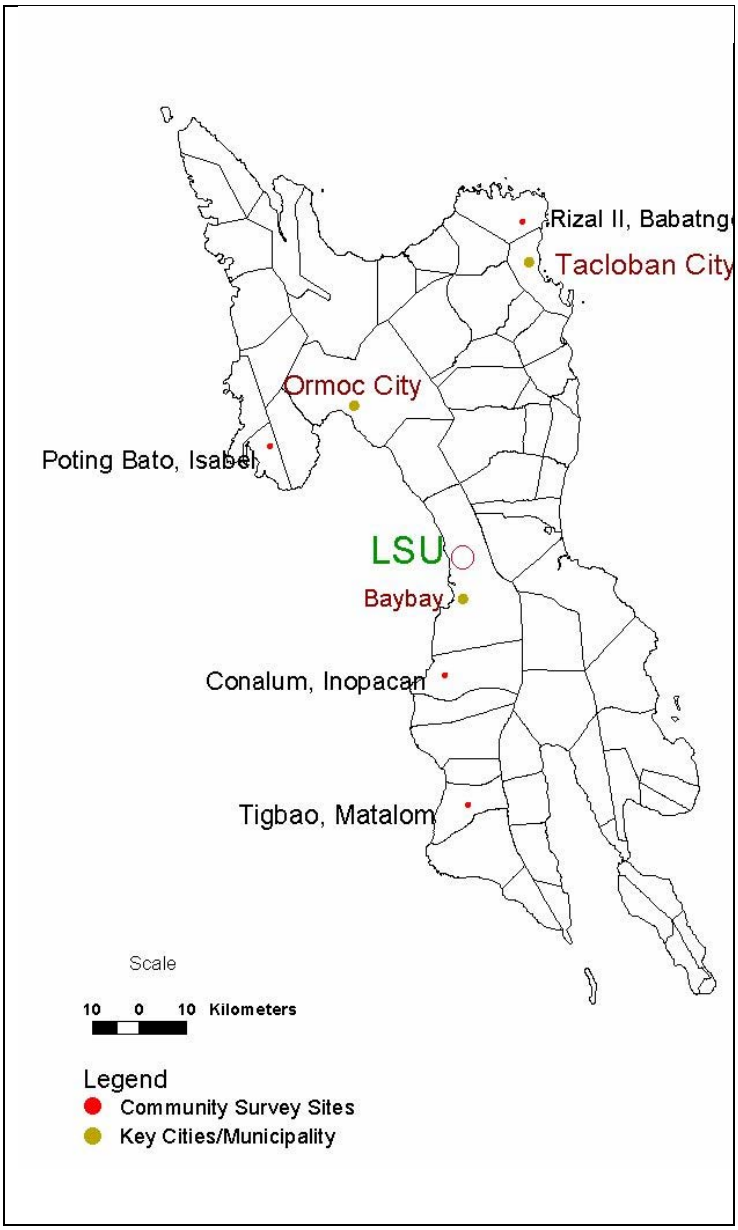

Figure 1. Location of the four communities in Leyte Province

Data gathered from the survey were encoded in SPSS (Version 10) and Microsoft Excel, and statistical analysis undertaken. A detailed description of the questionnaire development and survey procedure has been provided in Cedamon and Emtage (2004).

DESCRIPTION OF HOUSEHOLDS INVOLVED IN THE SURVEY

A notable feature of the household structure in the communities is extended families, i.e. a nuclear family plus some elderly parents or relatives. The average family size in all of the communities involved in the survey was five members (Table 2), with an average annual household income of PhP51,495. Most households were found to be dependent on agricultural income, supported by income from remittances and livestock. The average area farmed per household is 2.9 ha and the modal area 0.50 ha. About 8% of households had less than 0.25 ha, and two-thirds had one hectare or less, with only 18.4% having more than 4 ha (Table 3).

Table 2. Selected socio-economic indicators for households included in the survey

Socio-economic variable	Number of respondents	Mean	Median	Standard error
Household size	203	4.99	5.0	.16
Number of children below 12	196	1.61	1.0	.11
Number of children below 12 at school	191	.90	1.0	.08
Household gross yearly income (PhP/year)	203	51495	36400	3822
Average annual remittance (PhP/year)	143	7708	500	1417
Livestock income (PhP/year)	118	3795	1500	551
Farming income (PhP/year)	181	17607	13900.	1156
Income share from farming or fishing (%)	201	42.8	0.02	35
Total area of farm (ha)	196	2.91	2.0	0.30
Land size owned (ha)	203	1.4	0.5	0.24

Table 3. Land area classes of farms by household (n = 196)

Land size class (ha)	Conalum	Poting Bato	Rizal II	Tigbao	Total	Relative frequency (%)
Up to 0.25	7	3	0	6	16	8.2
0.26-0.50	9	6	5	2	22	11.2
0.51-0.75	2	6	3	1	12	6.1
0.76-1.00	4	6	4	3	17	8.7
1.01-2.00	14	8	5	12	39	19.9
2.01-3.00	2	9	8	13	32	16.3
3.01-4.00	5	3	8	6	22	11.2
4.01 or more	9	4	16	7	36	18.4
Total	52	45	49	50	196	100.0

Elementary school was the highest level of education achieved in 27.6% of households, just over half had at least one member with high school education, and

15% have a person with college education (Table 4). Notable differences between communities in terms of educational attainment include that half of the household respondents in Poting Bato had only elementary education, approximately twice the rate of other communities. On the other hand, households in Conalum and Tigbao had higher proportions of people with college and post-graduate education (Table 5).

Table 4. Highest level of formal education in household

Level of formal education	Frequency	Relative frequency (%)
None	1	0.5
Elementary	56	27.6
High school	113	55.7
College	30	14.8
Post graduate degree	3	1.5
Total	203	100.0

Table 5. Proportion of households with various highest level of formal education, by community

Community	Elementary (%)	High school (%)	College or postgraduate (%)
Conalum	16	61	24
Poting Bato	49	39	12
Rizal II	26	62	12
Tigbao	20	62	18

The type of materials used in household construction was recorded, with material classed as 'light' (usually bamboo, with grass or palm thatching), 'mixed' (commonly wood, sometimes with concrete, and with some light materials), and 'concrete' (majority of the house construction material is concrete or steel). It can be noted that half of the households surveyed in Conalum were constructed with concrete, contrasting with the situation in Poting Bato and Rizal II where half of the houses of those interviewed were made of light materials (Table 6).

PRESENT TREE PLANTING AND MANAGEMENT ACTIVITIES

Most of the respondents reported that they are currently managing trees on the land they operate (owned, leased or tenanted) (Table 7). This includes trees they have planted and trees that have regenerated naturally on their land. The difference between communities in proportion of households managing trees is not significant at the 5% level (d.f. = 3, Pearsons $\chi^2 = 3.756$, $p = 0.289$). Thirty nine households or 21% of the sample households across the four communities are not growing trees on any of their parcels of land.

Table 6. Percentage of respondents from each community with various types of house construction materials

Community	Light materials (%)	Mixed materials (%)	Concrete (%)
Conalum	21	29	50
Poting Bato	53	41	6
Rizal II	50	26	24
Tigbao	36	46	18

Table 7. Proportion of households managing trees

Community	Conalum	Poting Bato	Rizal II	Tigbao
Percentage managing trees	88	75	70	87

The total size of farmland where the sample landholders are growing crops and trees amounts to 570.6 ha, and the total number of individual trees currently being managed is 51,332 (an average of 313 trees per household). However, most households (61.0%) have 100 or fewer trees and only 12.8% have more than 500 trees (Table 8). These figures reveal the strong interest of farmers in small-scale tree farming to meet their own household demand for timber and fuelwood. On the other hand, it was found that landholders are planning to harvest and sell only about 16% of their trees for timber (Table 9). Table 10 presents the number of trees to be sold by households from the four communities surveyed. Less than 5% are planning to harvest timber for sale, so the total timber to be sold is controlled by only a few households.

It can be further noted from Tables 8 and 11 there is a skewed distribution of number of trees planted or managed per household. There are many households which have planted or are currently managing a few trees, with only a few households managing large numbers of trees.

Table 8. Frequency and percentage of trees planted or managed by households

Number of trees	Community				Total across communities	Relative frequency (%)
	Conalum	Poting Bato	Rizal II	Tigbao		
1-25	22	19	7	10	58	35.4
26-50	4	3	1	10	18	11.0
51-100	7	6	6	5	24	14.6
101-200	6	3	4	11	24	14.6
201-300	1	2	7	4	14	8.5
301-400	2	-	2	-	4	2.4
401-500	1	-	-	-	1	0.6
501-1000	3	4	3	2	12	7.3
1001-5000	-	3	4	1	8	4.9
5001-10000	-	-	1	-	1	0.6
Total	46	40	35	43	164	100.0

Table 9. Tree planting activities by household

Community	Total trees planted or managed	Number of trees intended for timber harvest	Number of trees planned to be sold
Conalum	5553	1517	275
Poting Bato	13890	256	0
Rizal II	24766	3805	5260
Tigbao	7123	2689	2215
Sum	51332	8266	7750
Mean	313	192	861
Number of respondents	164	43	9

Table 10. Number of trees intended for sale by household

Statistics	Conalum	Poting Bato	Rizal II	Tigbao	Total
Number of households	2	0	4	3	9
Median number of trees	138	0	805	725	260
Mean trees	138	0	1315	738	861
Total trees	275	0	5260	2215	7750

Although about 65% of trees are established in plots (Table 12), they are most likely being managed and grown together with coconuts (63.6%) and root crops (20.9%). Where trees were planted and managed on boundaries, the most common

crops being grown inside the boundary are rice (45.8%) and coconuts (33.9%). Crops grown with intercropped trees are coconut (84.0%) and root crops (12%).

Table 11. Total trees planted and managed by households

Community	Number of respondents	Median	Mean	Standard error	Sum
Conalum	46	33	120.7	31.18	5,553
Poting Bato	40	30	347.3	133.12	13,890
Rizal II	35	199	707.0	252.20	24,766
Tigbao	43	61	165.7	53.01	7,123
Total	164	60	313.0	66.62	53,332

Table12. Location of trees on farms

Location of trees on farms	Ratio to the total number of trees planted and managed (%)
In plot	65.3
In boundary	34.0
Inter-cropped trees	0.7
Total	100

In total, 88 different species being managed across the study sites. Despite the species diversity, 83.2% of the total number of trees belongs to 10 species, including mahogany, ipil-ipil, gmelina and molave, as reported in Table 13. The 88 species can be classified into six categories as presented in Table 14. Whether a tree species is high-value depends on final timber use. High-value species are used for building construction, furniture, poles and piles, while non-high-value timbers refer to those tree species used mainly for firewood, charcoal and light fencing. Trees categorized as non-high value timber species are generally pioneer or succession species, with height and diameter typically less than those categorized as high-value or premium species (diameter rarely more than 30 cm and height usually less than 10 m). Trees are classified as native (endemic or indigenous to the Philippine archipelago) or exotic (introduced to the country). Scientific names of some of the species mentioned are listed in Table 15.

Table 13. Number of trees planted and managed by species

Species name	Ratio to the total number of trees planted and managed (%)
Mahogany (*Swietenia spp*)	17.9
Ipil-ipil (*Leucaena leucocephala* Lam.)	15.1
Gmelina (*Gmelina arborea* Roxb)	11.9
Molave (*Vitex parviflora* Juss.)	10.5
Spike pipper	8.8
Balete (*Kingiondendron alternifolium*[Elm] Merr. and Rolfe)	5.2
Tibig (*Ficus nota* [Blanco] Merr.)	4.5
Kakawate (*Gliricidia sepium* [Jacq] Walp)	4.0
Caimito (*Chrysophyllum cainito* L.)	2.9
Bagalunga (*Melia duvia* Cav.)	2.5
Others	16.8
Total	100.0

Note: Scientific names were obtained from Fernando (undated).

Table 14. Classification of tree species

Native	Non-native
Native high-valued species Bagras, Molave, Narra, Antipolo, Pili, Bagalunga, Lanipga, Toog, Talisai, Lauan, Milipili, Apitong, Mancono	*Non-native,e high-valued species* Gmelina, Mahogany, Ipil-ipil, Raintree, Mangium, Auri
Native non-high-valued species Binunga, Kakawate, Dita, Hambabalod, Hawili, Balete, Anabiong, Tibig, Anislag, Taluto, Anilao, Bakan, Alagao, Alim, Nugas, Bogo, Hagimit, Ilang–Ilang, Suyapao, Bayanti, Banit, Banahaw, Mayapis, Anii, Spike pipper, Karot, Anangilan, Hanunumo, Matobato, Puilig, Tungating,Taling harap, Maraqaak, Palokas, Patsagaron, Tamawild, Tau-ot, Saqisi, Luta-luta, Tikoko, Alagasi, Kapok, Kape, Bago, Bangkal	*Non-native, non-high-valued species* Indian tree
Native fruit trees Sunkist, Avocado, Seniguelas, Sampalok, Bread fruit, Guyabano, Marang, Tisa, Pomelo, Santol, Jackfruit, Star apple, Cacao, Mango, Rambutan, Guava, Macopa, Lanzones, Durian, Balimbing, Kalamansi, Duhat, Tambis	*Non-native fruit trees* No species identified

Table 15. Origin and timber quality of timber tree species mentioned by participants at the initial community focus group discussions

Species local name	Scientific name	Origin	Type
Anagasi	*Leucosyke capitellata*	Native	Non-high value
Anislag	*Securinega flexuaosa*	Native	Non-high value
Antipolo	*Artocarpus heterophylla*	Native	High value
Apitong	*Dipterocarpus grandiflorus*	Native	High value
Ayuhan[a]		Native	
Bagalunga	*Melia dubia*	Native	High value
Bagras	*Eucalyptus deglupta*	Native	High value
Bagtikan	*Parashorea plicata*	Native	High-value
Bangkal	*Nauclea orientalis*	Native	Non-high value
Bayong	*Afzelia rhomboidia*	Native	High value
Falcata	*Albizia falcataria*		Non-high value
Gmelina	*Gmelina arborea*	Exotic	High value
Ipil-ipil	*Leucaena spp.*	Exotic	High value
Kamagong	*Diospyros philippinensis*	Native	High value
Kaningag	*Cinnamomum mercadoi*	Native	Medicinal
Mahogany	*Swietenia macrophylla*	Exotic	High value
Mancono	*Xanthostemon verdugonianus*	Native	High value
Mangium	*Acacia mangium*	Exotic	High value
Molave	*Vitex parviflora*	Native	High value
Narra	*Pterocarpus indicus*	Native	High value
Neem tree	*Melia adzedarach*	Exotic	Non-high value
Patsaragon[a]		Native	
Pine tree	*Pinus spp.*	Exotic	High value
Rain tree	*Samanea saman*	Exotic	High value
Red and White Lauan	*Shorea spp.*	Native	High value
Rubber tree	*Ficus spp.*		Non-high value
Taluto	*Pterocymbium tinctorium*	Native	Non-high value
Toog	*Combretodendron quadrialatum*	Native	High value
Yakal	*Shorea malibato*	Native	

Notes: Scientific names were obtained from ERDB (1998), Ponce and Bangi (1988) and Lawrence and Mangaoang (1999).

a. No scientific name was found for these species.

As indicated in Table 16, non-native, high-valued timber trees account for 46% of the total number of trees managed by respondents, followed by native non-high-valued timber species (30%). Aside from non-native premium species overwhelmingly dominated by gmelina, mahogany and ipil-ipil, it can be inferred that farmers may still prefer to plant native species (whether high-valued or not) because of their known

uses and adaptation to soil and climatic conditions. Gmelina and mahogany are popular species in Philippine reforestation sites because they have been proven to grow in almost all areas in the Philippines (Mangaoang and Pasa, 2003). These two exotic species are widely used for construction and furniture manufacture. Concerning fruit production, no household in the community survey has planted non-native fruit trees.

Table 16. Tree growers' preference for types of species

Tree species category	Share of the total number of trees planted and managed (%)
Native high-valued species	16.0
Non-native, high-valued species	46.4
Native non-high-valued species	30.3
Non-native, non-high-valued species	0.0
Native fruit trees	7.3
Non-native fruit trees	0.0
Total	100.0

Respondents were asked to indicate up to three functions for each species of tree they managed on their land. On average, approximately 50% of the trees serve to provide timber for the households' own use and 25% act as fruit trees (Table 17). Other functions typically made up less than 10% of each community's total responses, notable exceptions being 'soil protection' in the cases of Conalum and Poting Bato, 'timber for sale' in Rizal II, and establishing an asset for future generations in Tigbao.

Table 17. Frequency of use of trees for various functions by communities

Function of trees	Conalum	Poting Bato	Rizal II	Tigbao	Total
Timber for own use	104	106	64	145	419
Fruit	66	38	55	51	210
Soil protection	35	27	6	7	75
Asset for future generations	10	4	10	25	49
Timber for sale	10	3	21	10	44
Shade for crops	16	0	7	4	27
Copra	5	0	0	0	5
Total	246	178	163	242	829

Some differences in pattern of use of trees were identified between communities. In Tigbao the dominant functions for trees are to provide timber for the household, followed by the lowest use for fruit production of all communities, then the highest rate of bequest for future generations. The respondents from Poting Bato reported a similar emphasis on the provision of timber for the household and fruit production; however, they made the least mention of bequest functions, and the highest use of trees for soil protection. Respondents from Conalum reported a greater than average

use of trees for soil protection, and the highest use of trees to provide shade to their other crops including Abaca (*Musa textelis* Nees). The use of trees for the construction of low-cost copra dryers was reported from Conalum. Finally, the respondents from Rizal II reported the greatest use of trees for fruit production and to produce timber for sale.

SOURCES OF PLANTING ADVICE AND PLANTING STOCK

Another important aspect in timber production is the sources of advice before planting and the sources of planting stock. Nearly 22% of responding households (27.8% of those which have timber plantings) have sought advice before planting. Sources of advice are summarised in Table 18. It can be noted that DENR, being the only government agency in environment and natural resources management, had been the source of information on how to plant trees by about 36% of those who seek advice before planting, while about 30% received information and advice from their friends or relatives who have experience in tree farming. Other sources of information include Local Government Units (LGU), the Department of Agriculture (DA), Department of Agrarian Reform (DAR), Philippine Coconut Authority (PCA), Peoples' Organization (PO) and Non-Government Organizations, as well as attendance at training courses and seminars run by these organizations.

Table 18. Sources of advice about planting

Source of advice about planting	Frequency	Relative frequency (%)
DENR	16	7.9
Relative or friend with tree farming experience	13	6.4
Peoples Organization	4	2.0
Seminars and trainings	4	2.0
Local Government Unit or Department of Agriculture	3	1.5
NGO	3	1.5
DAR/PCA	1	.5
Total who sought advice	44	21.7

A total of 37,165 trees (72.4%) had been planted and 14,167 (27.6%) were from natural regeneration. Planting stock for planted trees was obtained from own nursery, collection of seeds and wildlings (71.2%), purchased seed (10.6%), other nurseries (9.8%) and the DENR (7.6%). This means that a high proportion of small-scale tree farmers raise their own seedlings or collects seeds and wildlings for their planting stocks needs. Natural regeneration on the other hand comprises about 27.6% or 14,167 of the trees being managed by households.

TREE REGISTRATION AWARENESS AND BEHAVIOUR OF HOUSEHOLDS IN THE COMMUNITIES SURVEYED

The majority of provinces in the Philippines are subject to a logging ban for native forests. To help enforce the logging ban while at the same time allowing landholders to harvest timber they have planted on their own land, the government through the DENR uses a system of registering planted trees. Respondents were asked to indicate if they had registered their trees, if they knew how to register trees, and if they have not registered them, why not. Only four respondents, approximately 2%, reported that they had registered all or some of their planted trees; while 33 respondents (16%) indicated they knew how to register trees.

Respondents were asked to indicate why they had not registered their trees if they knew how to do so. The most common response was that the trees would be registered when harvest began. Others stated they had no trees to register, or that there were too few trees to bother. Two respondents, from different communities, reported that they had heard the DENR would confiscate the trees if they were registered. Notably, almost all of the reasons why the respondents have not registered trees amount to basically a lack of awareness of tree registration. Another concern reported was distance from the Community Environment and Natural Resources Office [2] (CENRO); a knowledge of the process of tree registration is of little value if the CENRO is so far away that access to the agency is almost impossible and that travelling to CENRO for tree registration involves a high cost. There was evidence that community members had some apprehension about the DENR personnel who were involved in tree registration process (Table 19).

CONCLUDING COMMENTS

One important finding of the community survey is that the majority of households (about 80%) have planted or are currently managing trees, the primary purposes of which are to meet their own needs for timber for household construction and fruit production, although over half of them have planted 100 or fewer trees. This finding basically demonstrates that given the high rates of rural poverty in Leyte Province, encouraging timber planting by smallholders or small-scale farmers appears desirable as an additional source of income and to assist in overcoming the deficit in timber supplies. There is a strong case for conducting an intensive information and education program on tree farming and utilization including propagation of planting stock to encourage smallholders to take up small-scale tree farming.

[2] Community Environment and Natural Resources Offices (CENROs) are branches of the Department of Environment and Natural Resources (DENR) extending services on environment and natural resources to a number of municipalities in one or more districts in a province. One of the services of CENROs is tree registration.

Table 19. Frequency of reasons for not registering trees despite knowing how to do so

Reason for not registering	Frequency
Not mature for harvest	6
No trees	4
Few trees	4
Too busy	2
Wary of DENR taking trees	2
Because they own the land	1
Too far from CENRO	1
The trees are not managed	1
Don't own the trees	1
Community Organization decision	1
Financial constraints	1
No land title	1

It is also notable that mahogany, ipil-ipil and gmelina are the most widely grown species. Even though most of the planting stock came from farmers' own collection of seeds, wildlings and nurseries, one of the main sources of information on tree planting and management is the DENR. Almost a decade ago, the DENR was active in promoting nationwide tree planting using exotic species including mahogany, gmelina and ipil-ipil. Reports from households on the type of species planted and the sources of information on tree planting basically demonstrate some success of the DENR reforestation efforts.

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