

### 3. EVALUATING THE EFFECTIVENESS OF A SMALL-SCALE FOREST EXTENSION PROGRAM ON LEYTE ISLAND, THE PHILIPPINES

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This paper describes the evaluation of a forestry extension program on Leyte Island, the Philippines which was undertaken as one of the activities of Australian Centre for International Agricultural Research (ACIAR) project ASEM/2003/052, *Improving Financial Returns to Smallholder Tree Farmers in the Philippines*. The program provided technical assistance to 22 farmers using a field tour and follow-up visits to individual farms as the main extension activities. Farmers responded positively to assistance and overcame difficulties caused by incessant wet weather to grow seedlings and establish timber plantations on unproductive privately owned land. Although the extension assistance was available to any farmer who owned land suitable for planting trees, the program inadvertently targeted a relatively well-off cohort of smallholders who are typically semi-retired or have employment other than on their farms. Evaluation of the program was undertaken by collating a chain of evidence from translated interviews and conversations, reports by extension staff, corroboration by external observers and visual observations. Seventeen of the farmers identified lack of seed or seedlings as major constraints to the expansion of tree growing but did not consider that marketing trees was likely to be a problem in the future. Farmers had little knowledge of nursery procedures and five of them required assistance to set out, stake and plant their trees. Formative evaluation undertaken to guide the delivery of the program indicated that extension activities were well received by farmers. However, eight farmers established plantations on sites which are unsuitable for the growth or marketing of trees. Farmers also prioritised other farming activities over extension assistance and this complicated the scheduling of field visits. Summative evaluation of the program indicated that a hypothetically expanded program would attract support from farmers. However, further research is needed to ascertain the size of the cohort of farmers in Leyte who are likely to respond to extension assistance to grow timber plantations.

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#### INTRODUCTION

This paper describes the delivery and evaluation of an extension program in the municipalities of Libagon and Dulag on Leyte Island (Figure 1), the Philippines. The background to the extension program is that following uncontrolled logging of native forest on the island of Leyte over the last 50 years, the sawmilling industry has collapsed (Severino 2000) with native forest now mainly confined to inaccessible and remote areas. Timber is either imported or sourced from coco-lumber sawmills on roadsides which produce low quality timber for domestic use. However, some farmers have planted timber trees, either as monocultures or intercropped with cash crops, coconut palms, fruit trees or the shade tolerant abaca palm (*Abaca musilis*). Small-scale timber plantations are known locally as 'tree farms'<sup>1</sup> and in the rural landscape, their main competitor for land use is coconuts. One of the main species used for timber plantations is *Swietenia macrophylla* (mahogany).

The scattered occurrence of tree farms suggests that forestry is not feasible or acceptable to farmers. Franzel *et al.* (2002) defined feasibility as dependent on farmers' land, labour and capital, information and skills and the ability to cope with unforeseen problems. For an agricultural practice to be acceptable, it must be profitable and also satisfy 'a range of criteria that are difficult to quantify, such as risk and general compatibility with farmers' values' (Franzel *et al.* 2002). This presents difficulties in assisting farmers to make decisions about timber plantation management because while biophysical aspects of tree growing are well described in the literature, the aims and aspirations of Filipino farmers are less well understood. Improvements which can be

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<sup>1</sup> The term *tree farm* refers to the portion of a farm, often a small fraction of a hectare, which is planted with trees for timber production.

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managed as part of the farming system and do not require expertise or equipment are more likely to be welcomed by farmers.

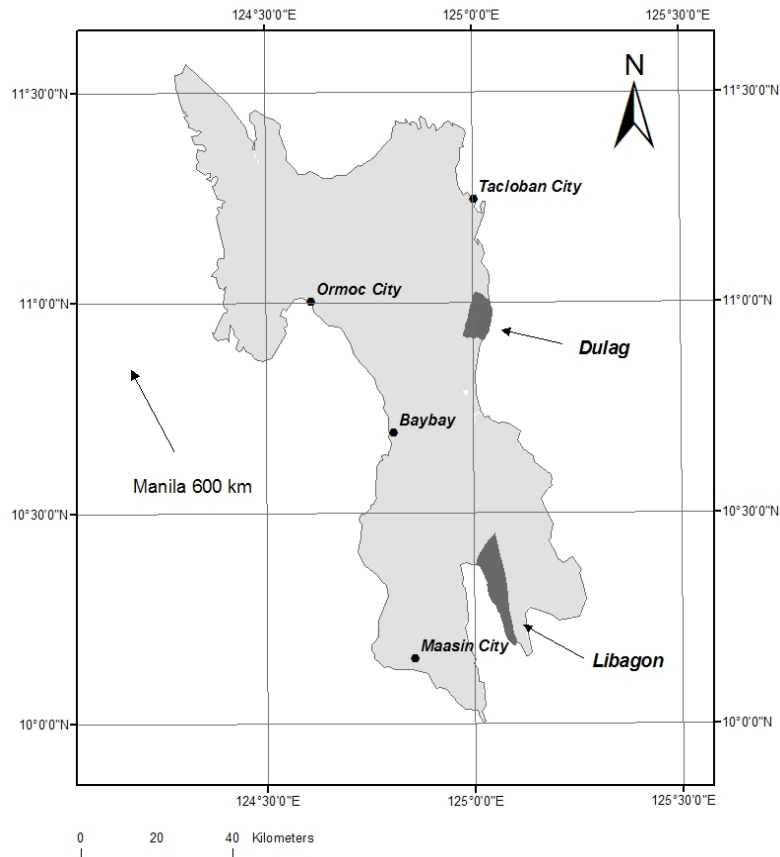


Figure 1. Map of Leyte Island showing principal cities and the municipalities of Dulag and Libagon in which the extension program was undertaken

Rural Filipinos have little access to agricultural or forestry related scientific information. Department of Environment and Natural Resources (DENR) extension material including the Agroforestry Technology Information Kit (ATIK) booklets and a recently released compact disc describing species-site compatibility have only a small circulation. Consequently, there is a need for smallholders in Leyte to be able to access technical advice so they can evaluate the risk and likely outcomes of timber plantations and make informed decisions.

Accordingly, the ACIAR project supported the design and delivery of an extension program which offered farmers technical assistance to grow seedlings, establish plantations and improve the silvicultural management of existing plantations. A primary objective (Objective 1) of the extension program was to evaluate the effectiveness of technical assistance in increasing the adoption of small-scale forestry and improving the silvicultural management practices of smallholders. A secondary objective (Objective 2) was to analyse the constraints, opportunities and resource requirements involved in scaling up this extension program from the local to the regional level.

The evaluation of Objective 1 was *formative*, while the evaluation of Objective 2 was *summative*. Roberts (1999) described formative evaluation as being undertaken for the development and maintenance of a program, with summative evaluation undertaken for the needs of program providers, i.e. whether the program is worthy of continued support or expansion. Therefore, the challenge for extension staff was to present extension activities in tandem with complementary formative and summative assessments which could provide information about the effectiveness of the program.

The dynamics of the farmer-extension worker interaction are complex in Leyte because of typically wide differences in education, wealth and even language between the two parties (Campilan and Vega 1998). A direct approach to communication and problem solving is often not appropriate for Filipino farmers (Goldoftas 2006) and misunderstandings often occur. Complexities of language, culture and goals act to make the evaluation of an extension program difficult.

The difficulty of resolving these issues is addressed by the 'responsive' form of evaluation recommended by Guba and Lincoln (1989), in which all parties are involved in the evaluation process and where issues are negotiated through consensus. This is often impractical in developing countries because the lives of farmers are generally dominated by insecurities (Heim 1990) and their focus is day to day economic survival. Cramb (2000) argued that rather than acquiring a 'fully baked' technology, 'off the shelf' farmers can be viewed as shopping around for 'ingredients' or technological components which they incorporate into their own recipes. This suggests that for this extension program, farmers should be encouraged to interpret and apply technical information in a manner that they perceive to be appropriate to their particular circumstances.

This paper describes the evaluation of an extension program on Leyte Island in which silvicultural technology<sup>2</sup> was offered to small-scale farmers to establish and manage plantations of trees for timber. The focus of the paper is the assessment methods which were used to guide the evaluation of program from September 2005 to October 2006. The next section describes the design and delivery of the extension program. Subsequent sections describe the evaluation of extension materials and activities and the tracking of farmers' involvement in the program. Finally, the constraints, opportunities and resource requirements for a scaled-up program are discussed.

## RESEARCH METHOD: DESIGNING, DELIVERING AND EVALUATING THE EXTENSION PROGRAM

Guidance in the selection of silvicultural advice which would be appropriate for small-scale plantations in Leyte was provided by an expert group (Appendix A). The recommendations of the expert group became the basis of assistance which was offered to farmers in the municipalities of Libagon and Dulag, in Leyte and Southern Leyte Provinces, respectively. As is typical of much of Leyte, the main crops in these municipalities are rice and coconuts. The area of Dulag is approximately 11,000 ha compared with 13,000 ha for Libagon. However, the population of Dulag is much higher (40,000) compared to Libagon (13,000) because there is a higher proportion of flat coastal land suitable for cropping (Municipality of Dulag 2002, Municipality of Libagon 2002).

### The Underpinning Rationale of the Extension Program

The underpinning rationale of the extension program was that improvements to the long-term adoption of small-scale forestry or the silvicultural management of plantations were most likely to be achieved through the provision of technical advice. Therefore, no financial assistance was provided and the supply of materials was limited to seedling trays and seed. Also, while farmers were advised that technical information was offered in good faith as sound silvicultural science, they were encouraged to evaluate the advice critically and adapt it to their personal circumstances. The extension approach was therefore *positivist*<sup>3</sup> with regard to the technology and *constructivist*<sup>4</sup> in the manner in which farmers were encouraged to make their own personal interpretation and use of it.

Technology was offered to farmers as 'optional inputs' which they might care to consider for their particular circumstances. In the same manner as Yin (2005) described a chain of evidence as being necessary to support the reliability of findings in case studies, assessment of extension activities tracked farmers' actions throughout the program. Yin (2005) also described the validity<sup>5</sup> of constructs derived from evidence as being maximised through triangulation to multiple sources of evidence. Accordingly, the evaluation used interviews, comments by visitors and visual observations as sources of data.

Extension assistance was offered in four steps as illustrated in Figure 2. The first step was designed to engender goodwill and trust between extension staff and farmers by inviting the farmers to participate in a field tour.

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<sup>2</sup> For the purpose of this paper, *silviculture* includes all aspects of raising seedlings in home nurseries, setting out and establishing plantations, thinning and pruning.

<sup>3</sup> A *positivist* view of knowledge or technology holds that there is a single objectively knowable psychosocial world organized by quantitative 'context free' laws. In this world, rigorous application of the experimental method can lead to universally valid knowledge (Fishman 2003).

<sup>4</sup> A *constructivist* view of knowledge holds that reality is subject to personal interpretation and that knowledge is actively constructed by the learner (Röling 1988).

<sup>5</sup> Patton (1997) defined internal validity as certainty about cause and effect, i.e. checking whether the program causes the observed outcomes. He defined external validity as the degree of confidence one has in generalizing findings beyond the specific situations studied.

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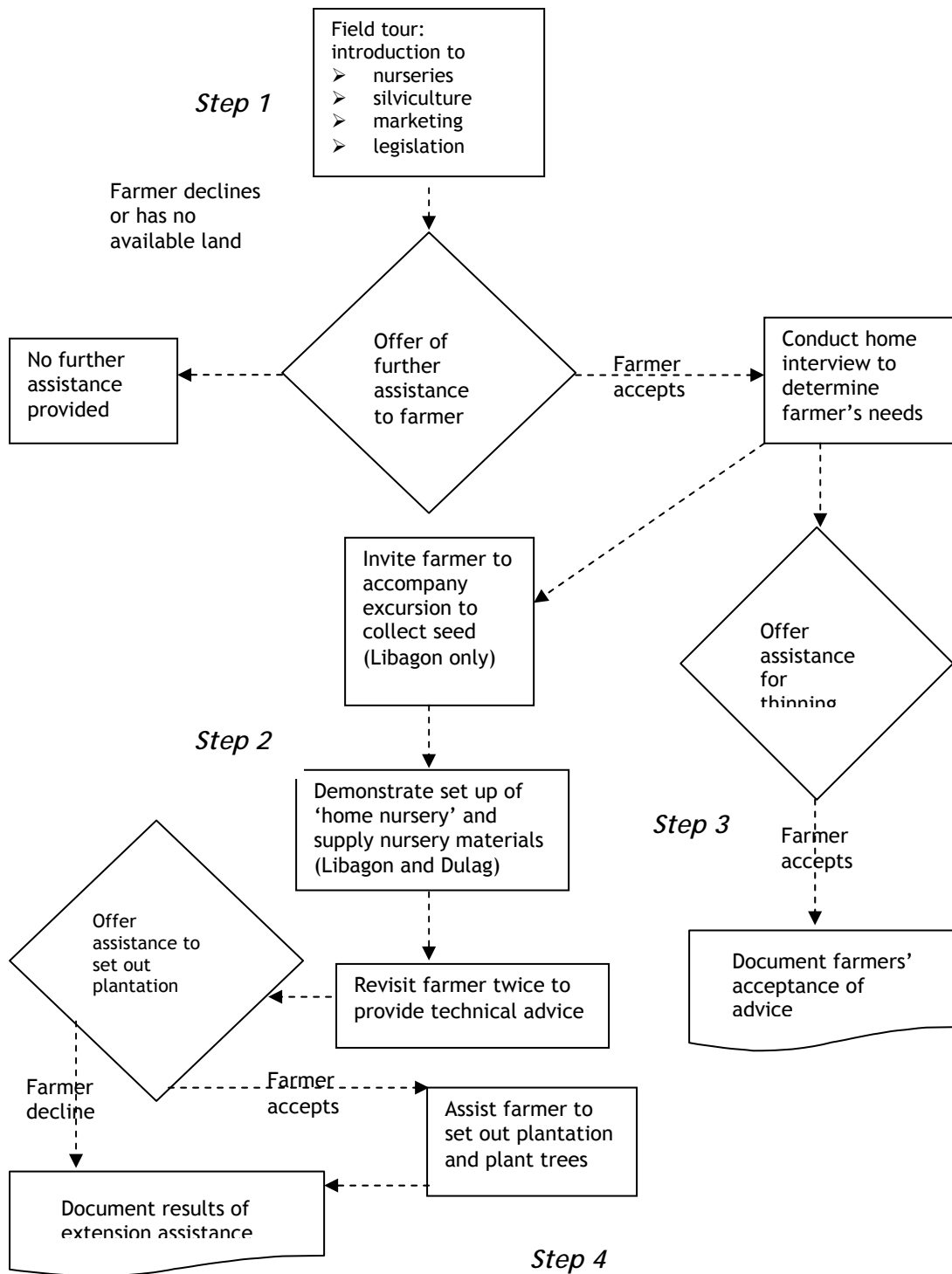


Figure 2. Flowchart of steps 1 to 4 of the extension process

The second step was the provision of assistance to farmers in setting up home nurseries in which they could germinate mahogany seed and grow seedlings. The third step, an offer to teach farmers how to thin and prune existing plantations, was made to farmers who had planted trees several years earlier and where the plantations had become overstocked or in need of silvicultural pruning. Finally, an offer was made to farmers to assist with the setting out and establishment of their new plantations.

### Step 1: Engendering Trust and Goodwill between Farmers and Extension Staff

A field tour was used to motivate farmers to grow trees by showing them plantations which had been successfully established and managed by other farmers. Field tours are a well-documented extension technique (e.g. Mortiss 1993, Van den Ban and Hawkins 1996) and are similar to the practice of 'cross visits' in Leyte where farmers from one municipality are taken to another to inspect farmers' practices and to have discussions with technical experts (Balbarino *et al.* 2002). The activities of the field tours (Appendix B) included technical discussions, demonstrations and practical activities in order to cater for the various preferred learning styles<sup>6</sup> of participants. A brief interview was also conducted with each farmer to collect basic demographic data.

Because of the short time for which farmers could be expected to be absent from their farms, the tours were limited to one day and run to a tight schedule. Consequently, although time was allocated for farmers' questions, the schedule limited the in-depth treatment of topics in which farmers may have been interested. Hence, at the end of the tour, farmers were asked whether they wished to be involved in the program and arrangements were made to visit them in their homes so that arrangements could be made to provide further technical assistance.

The field tours for farmers who lived in Libagon and Dulag were held in October and November 2005 respectively, prior to the maturation of mahogany seed which was available for collection and sowing in February 2006.

### Step 2: Provision of Technical Advice

After the field tours, interviews were held with each farmer and their immediate family. The purpose of the interviews was to establish that the family owned land on which they wished to grow trees and that there were no impediments to their involvement in tree growing activities. If the farmer agreed, arrangements were then made to schedule further extension assistance.

The first extension activities were the collection of mahogany seed and the setting-up of home nurseries. No mahogany seed was available in Dulag, so the only alternative was to supply these farmers with seed which had already been collected by extension staff. In Libagon, extension staff obtained permission to collect seed pods from a stand of mature mahogany trees and farmers were invited to join an excursion to collect seed. The seed was distributed amongst the farmers and in the following week farmers in both municipalities were shown how to mix potting soil and set up a home nursery. As a small gesture of goodwill, farmers were supplied with two Queensland Native Tube (QNT) seedling trays or one seedling tray and 100 polybags.

In subsequent weeks, extension staff visited each home nursery twice to provide advice in germinating and growing seedlings. In almost all nurseries, fungal problems and predation of seedlings by rats and chickens were severe and sowing a new batch of seeds was necessary. Although these visits were time consuming, they enabled extension staff to provide further advice on site preparation and plantation establishment.

### Step 3: Assistance to Thin or Prune Existing Plantations

The third step of extension assistance was offered to farmers who owned existing plantations. Extension staff offered to visit their farms so that thinning and pruning techniques could be explained to them. For thinning, the offer was made to two farmers who had participated in a field tour and two who had not. Only one farmer owned trees for which pruning was recommended.

### Step 4: Assistance to Set out Plantations and Plant Trees

Finally, for farmers who expressed doubt over their ability to set out and establish plantations, extension staff offered to visit the farms and to provide personal assistance in positioning seedlings away other overstorey species (mainly coconuts) and staking and planting trees. The visits were scheduled after farmers had cleared the sites of competing vegetation and had burnt or cultivated the site to remove excess growth of cogon grass *Imperata cylindrica*. This assistance necessitated an overnight stay in the municipality for extension staff, including extensive walking to the farm (in one case three hours) and the physical labour of establishing the plantation.

### Assessment Carried out in Conjunction with Extension Activities

Wherever possible throughout the extension program, assessment of the effectiveness of extension assistance was carried out in conjunction with each extension activity (as described in

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<sup>6</sup> To the extent that teachers or extension workers do not include activities which allow students either to engage in a practical activity, reflect on what they have learnt, or put a theory into practice, the teachers deny a proportion of their students the opportunity to learn in their preferred learning style (Swepson 1990).

Figure 3) to guide formative and summative evaluation of the program. The data source for the assessments included written reports by extension staff, written commentary by external observers, translated records of conversations between farmers and extension staff and visual observations made by extension staff.

Interviews and conversations between extension staff and farmers were recorded in one of the two local dialects, Cebuano and Waray Waray and subsequently transcribed and then translated into English. In a similar manner to the procedure described by Miles and Huberman (1994) for the coding of themes in text, the conversations were then analysed to find sections of the text with themes which were common to conversations with different farmers. For example, farmers were asked about their reasons for planting trees and common responses included 'to pay school fees', 'as an inheritance' and 'for my old age'. The common theme amongst these responses was interpreted as *willingness by farmers to plan for the future*.

Extension staff also provided *trip reports* of meetings with farmers. These trip reports provided an objective account of each extension activity and a subjective assessment of farmers' acceptance of extension advice. Whenever an Australian project researcher accompanied Filipino extension staff on farm visits, visual observations of farmers' actions and translated responses to direct questions were used in triangulation between assessments made by the various team members.

Improving the Triple Bottom line Returns from Small-scale Forestry

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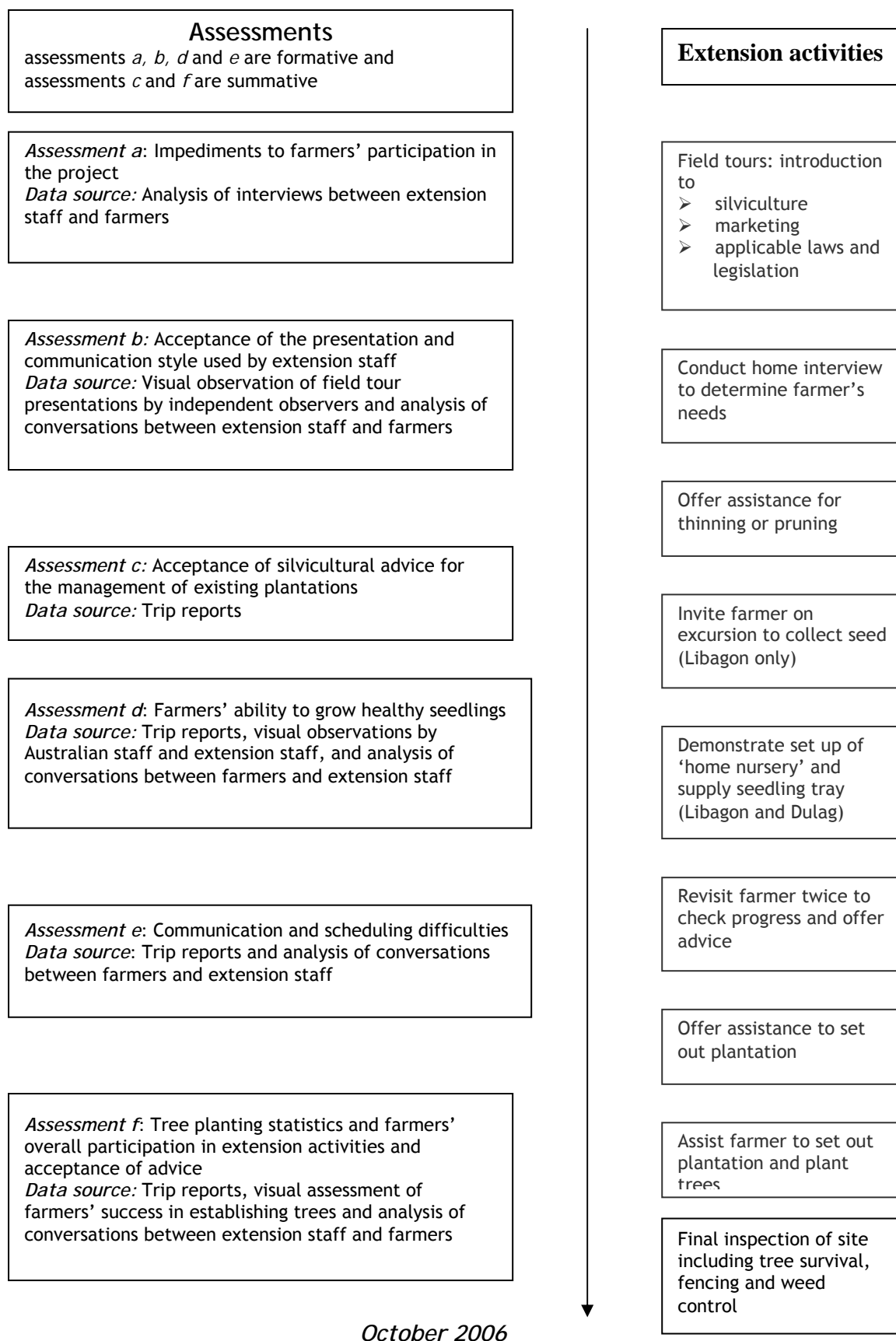


Figure 3. Sequence of formative and summative assessments used in the extension program

## FARMERS' DEMOGRAPHIC CHARACTERISTICS AND ANALYSIS OF THE ASSESSMENT DATA USED TO INDICATE THE EFFECTIVENESS OF THE PROGRAM

The responses to the interviews undertaken with each farmer during the field tours were similar for both municipalities, as reported in Table 1. The demographic details of each cohort of farmers (14 in Libagon and 10 in Dulag) show similarities between farmers' average age, the proportion of their time spent farming and the number of people in each household. Almost all of the farmers are actively involved in farming but also have part-time employment or are semi-retired. Experienced extension staff employed by the project considered that the average number of farm holdings (3) and the average total farm area (6.1 and 3.8 ha for Libagon and Dulag respectively) indicated that these farmers are relatively wealthy smallholders compared to poorer smallholders who are often tenant farmers. The most common farm crops are coconut and bananas and this is to be expected because the income from irrigated rice fields is too high for them to be considered for plantation forestry. Only two farmers in Libagon had ever received any forestry training although a larger number (seven farmers in Libagon and three in Dulag) had received agricultural training. Overall, the demographic characteristics suggest that these farmers represent a small demographically similar sample of the overall farmer population in Leyte.

Table 1. Demographic characteristics of 14 farmers interviewed in the municipality of Libagon and 10 farmers interviewed in the municipality of Dulag

Demographic characteristics	Municipality	
	Libagon	Dulag
Number of farmers interviewed	14	10
Average age	52.8	54.7
Proportion of time spent farming (%)	60	58.5
Average number in household	5.1	4.4
Average area of farms (ha)	6.1	3.1
Average number of farm holdings	3	3
Main land use	Coconuts	Coconuts
Second main land use	Bananas	Bananas
Number who had participated in previous agricultural aid projects	3	1
Number who had received previous forestry training	2	0
Number who had received previous agricultural training	7	3

### *Assessment a: Interviews with farmers to ensure that farmers were willing and able to establish plantations*

Analysis of interviews conducted with 13 farmers in Libagon and 10 farmers in Dulag after the field tour revealed themes in the responses that were common to several farmers (Table 2). Virtually all farmers wished to sell the trees at maturity or to use them for housing or as a bequest. Five farmers cited environmental reasons as a secondary reason for planting trees. Lack of seed or seedlings was cited a major constraint to the establishment of plantations by nine farmers in Dulag and eight farmers in Libagon. Only two farmers in each municipality considered that tree registration may be a problem in the future and – for farmers who did not have secure title to their land (seven farmers in Libagon and four farmers in Dulag) – negotiating with the owners of the land did not present an impediment to the establishment of trees. Overall, there was consensus amongst the farmers that the availability of seed or seedlings was a major constraint to the adoption of plantation forestry and that tree registration, marketing and land title issues were not constraints.



Table 2. Common interview themes extracted from farmers' responses to loosely structured questions

Theme underpinning farmers' decision to plant trees	Municipality	
	Libagon	Dulag
Number of farmers interviewed	13	10
The main reason for planting trees is commercial sale or domestic use	11	10
A secondary reason for planting trees is for the environment, i.e. flood control, erosion, beautification or shade	5	5
Lack of seed or seedlings is a major constraint to the uptake of plantation forestry	9	8
Registering or selling trees is unlikely to be a problem in the future	11	8
Timber plantations will be intercropped	5	4
The farmer has secure title to the land	6	6
The farmer does not have title to the land but can negotiate with other owners to plant trees	7	4

*Assessment b: Assessment of farmers' acceptance of the presentation and communication style used by extension staff*

The assessment of field tour presentations was made on the basis of written commentary by independent observers. For the field day in Libagon, a written assessment of the appropriateness of presentation techniques used by extension staff was supplied by a DENR officer. The assessment indicated the manner in which field day activities were presented and received:

The participants were very active in participating in the diameter measurement exercise. After the explanation by Sammy, the participants were able to understand the procedure on how to measure the actual diameter of their planted trees as well as the tallying procedure of trees subjected to inventory. This exercise is needed to be replicated as part of the training activity in some DENR projects particularly..... (Tan 2005).

For the field day for farmers from Dulag, three independent observers noted that the field days were conducted 'in a highly professional manner' (Gold 2005), that extension staff 'were attentive to queries from farmers and mingled well with them' (Waquainabete 2005) and 'worked well as a team' (Neal 2005). These records provide corroboration of the extension skills of extension staff.

*Assessment c: Farmers' acceptance of silvicultural advice for the management of existing plantations*

The offer made to two farmers from Libagon for assistance in thinning their plantations was rejected. This mirrors the previous rejection of advice given to two other farmers to thin overstocked and dense plantations. On the previous occasion, one farmer had asked for scientific literature on the topic. After being provided with this evidence, he still decided not to thin his trees. No specific reason was given for the rejection of the advice but the farmer used a Cebuano idiom which translates into English as 'it's such a waste' when describing his reluctance. This idiom is used by Filipinos to describe their reluctance to throw something away which may still have some value (Cedamon 2006).

One other farmer from Libagon was offered advice on pruning techniques used in industrial forests to produce knot-free wood. Although the farmer commented that the trees were only planted to stabilise a creek bank and that pruning was not necessary, the rejection of the advice was anticipated because on other occasions, farmers had demonstrated how they left long branch stubs on trees which they pruned. The branch stubs were retained so that at a later date labourers could use them as a ladder to climb the tree to prune branches higher up.

For both thinning and pruning, the rejection of silvicultural advice indicated that farmers do not accept that pruning and thinning techniques which are applicable to industrial plantations are useful to them. Hence, there would appear to be little purpose in prioritising this advice in future extension programs.

*Assessment d: Visual assessment and analysis of conversations with farmers' about the care of seedlings*

The months in which farmers undertook germination of mahogany seed and raised seedlings (November 2005 to March 2006) were unusually wet with precipitation almost every day. Consequently, home nurseries which were unprotected from the rain had little chance to dry out. Fungal infections rotted seeds or killed seedlings in almost every nursery and predation by chickens and rats was severe for seedlings which were placed on the ground.

An inspection of farmers' nurseries at Libagon in February 2006 showed that each farmer had attempted to grow approximately 100 seedlings and survival after three months was only 50%. Farmers in Dulag experienced similar seed and seedling mortality. To assist farmers to overcome these problems, extension staff visited farmers in both municipalities in March and April 2006. They advised farmers to discard the soil in which seedlings had rotted and to sow a fresh batch of seeds in newly prepared soil. Advice to separate seedlings to reduce the transfer of fungal infection was largely ignored, but farmers responded to advice to elevate seedlings above ground level to increase air-flow and to remove them from the reach of chickens and rats.

Farmers were advised to spray seedlings with Benlate®, a nursery fungicide widely used where excess watering is likely to cause seed and seedling deaths. Not one farmer in either municipality opted to use fungicide to reduce seedling mortality. Instead, farmers re-sowed seeds in the pots where seeds had rotted or discarded the infected soil and started the germination process again.

By October 2006, only one farmer in Libagon had abandoned efforts at growing seedlings and 11 farmers had successfully grown and planted an average of 86 trees each. In Dulag, two farmers had abandoned attempts to grow seedlings. However, two farmers took the opportunity to expand their home nurseries through the purchase of extra polybags and the seven remaining farmers each raised and planted an average of 279 seedlings.

When compared to farmers' rejection of advice for thinning and pruning, visual assessment of farmers' acceptance of advice concerning nursery hygiene was heartening for extension staff. Farmers' rejection of advice to purchase fungicide was tacit rather than explicit, i.e. farmers mixed new potting soil, improved the airflow through their nurseries and protected the seedlings from predators. Hence, this assessment indicates that farmers were willing to accept advice where it was apparent that it was their best interests to do so.

*Assessment e: Written records of scheduling difficulties for the seed collecting excursion, home nursery demonstrations and field visits to farmers' nurseries and plantations*

The opportunity to evaluate the efficiency of visits to farmers was provided through written *trip reports* made by extension staff and transcribed and translated recordings of conversations with farmers. In Libagon, the mayor and the municipal agricultural officer (MAO) were cooperative and the MAO accompanied extension staff whenever possible. However, in Dulag the mayor showed no interest in the program and extension staff liaised directly with farmers and the MAO. In both municipalities, the practice of sending schedules of impending visits to the MAO did not ensure that the information was passed on to farmers. On one visit each to Libagon and Dulag this caused confusion between extension staff and farmers.

Almost all farmers in both municipalities showed a reluctance to prioritise meetings with extension staff and a variety of excuses was used by even more committed farmers. The excuses were various – the weather was too hot, the rice harvest was in progress, relatives were sick and children had weddings or graduation ceremonies.

Assessment of the time wasted by these delays is difficult, and the trip reports do not indicate the frustration that was likely to have been felt by extension workers. However, in order to collect data concerning the growth of seedlings and the progress of out-planting, it became necessary for extension workers to visit farmers at their houses to schedule subsequent visits to their farms. Many farmers do not possess mobile telephones and there appears to be no simple remedy for this problem.

*Assessment method f: Tree planting statistics and summative assessment of farmers' overall participation in extension activities and acceptance of advice*

The summative assessment (f) was derived from data provided from trip reports and visual observations of farmers' success in growing seedlings and establishing plantations (Tables 2, 3 and 4).

### Participation in Extension Activities

Table 3 describes the overall participation and enthusiasm of farmers in Libagon and Dulag. Participation in the field tours was 16 farmers from seven of the 14 barangays<sup>7</sup> in Libagon and 11 farmers from seven of the 45 barangays in Dulag. Participation was lower than expected despite the field tour being advertised by local government officials and posters announcing the tour being given to barangay captains for display in the municipality. In both municipalities several farmers attended the field tour in the hope of being given financial support even though they did not own land and these farmers were refused assistance. In Libagon, only one farmer lost interest in the program and 12 farmers successfully grew more than 50 seedlings. Similarly, in Dulag, only two farmers lost interest in the program and seven farmers successfully grew more than 50 seedlings. Almost all farmers (11 farmers in Libagon and six in Dulag) undertook appropriate site preparation, either ploughing or clearing and burning weeds. Similarly 10 farmers in Libagon undertook subsequent weed control although only three farmers in Dulag undertook weed control because on three farms, the seedlings were washed away in a flood soon after planting. In summary, although the overall number of farmers participating in the program was low, almost all of the farmers persisted in growing and establishing plantations.

### Acceptance of Technical Advice

Farmers' acceptance of technical advice (Table 4) was limited to operations which they perceived as being necessary to grow seedlings and out-plant trees. For example, although almost all farmers (12 and seven farmers in Libagon and Dulag, respectively), accepted advice on the protection, watering and hardening of their seedlings, none of them were willing to purchase fungicide although they were advised to do so by extension staff. Initially, several farmers in both municipalities requested assistance to set out and plant their plantations, but all the farmers in Dulag planted their trees of their own accord. The readiness of farmers in Dulag to proceed without assistance may have been because on three farms, the trees were planted by hired labour who presumably knew what was required. However, six farmers in Libagon requested assistance to set out, stake and plant trees and they delayed planting their trees until extension staff were available to assist them. In Libagon particularly, many farmers appeared to be unaware of basic plantation establishment procedures.

### Summary Tree Planting and Survival Statistics

In Libagon the low average number of trees planted (73 trees, Table 5) reflects the limited space on individual farms for timber plantations. A much larger average number of trees were planted in Dulag (279) because three farmers had sufficient vacant land to warrant purchasing extra polybags to grow more seedlings. However, although the survival of trees in Dulag was affected by floods which washed away almost all the trees on three sites, the owners indicated to extension staff that they would continue planting other flood-free land. In Libagon, all five farmers who planted trees on inappropriate sites told extension staff that these were the only sites available to them and that the purpose of the planting was to make more intensive use of the land. Twelve farmers in Libagon and eight farmers in Dulag indicated that the extension program had met their expectations and they intended to plant trees in the following year.

Table 3. Participation in extension activities by farmers in Libagon and Dulag

Municipality	Number of farmers							
	Attended field tour	Participated in initial interview	Attended seed collection	Attended nursery set-up	Successfully grew more than 50 seedlings	Applied appropriate site preparation	Fenced seedlings against wandering buffalo	Applied subsequent weed control
Libagon	16	14	9	12	12	11	2	10
Dulag	11	10	N/A	7	7	6	2	3

<sup>7</sup> Each municipality is divided into smaller communities or *barangays* which encompass a village. Barangays are the smallest political unit in the Philippines.

Table 4. Evidence of farmers' acceptance of technical advice in Libagon and Dulag

Municipality	Number of farmers						
	Total	Farmers with existing plantations	Acceptance of advice for existing plantations	Potting soil prepared according to instructions	Applied fungicide	Protected, watered and hardened seedlings	Requested assistance to establish plantations
Libagon	13	3	0	9	0	12	6
Dulag	9	0	0	8	0	7	0

Table 5. Summary of farmers' tree planting activities in Libagon and Dulag

Municipality	Total number of farmers	Total number of trees planted	Mean number of trees planted	Tree survival after 6 months	Seedlings still to be planted	Sites to be planted in the future	Sites where planting trees was inappropriate
Libagon	13	943	73	Almost all	0	12	5
Dulag	9	1674	279	Approx 330	250	8	3

## DISCUSSION AND CONCLUSION

While the short timeframe of the program was not sufficient to show that the profitability of plantation forestry may be acceptable to farmers, the extension workers demonstrated that they could assist to make it feasible for farmers. The formative assessments indicated that the extension program was professionally delivered and the high retention rate of farmers until the end of the program provided corroboration that farmers valued the technical expertise of extension staff. The formative assessments also established that some farmers needed technical assistance to set out their plantations, albeit at a time of their own choosing. The provision of seed and seedling trays generated goodwill and the success of the program was not dependent on the provision of financial assistance to farmers. This is supported by farmers' comments that they intended to continue tree planting in succeeding years. The two visits by extension staff to farmers after the onset of fungal infections in home nurseries may have been instrumental in encouraging farmers through a discouraging period when incessant rain had resulted in widespread rotting of seed and wilt in seedlings. It is creditable that farmers and extension staff were able to remedy this problem without recourse to fungicides.

Although Dulag has a much higher proportion of land used for growing rice than Libagon, the demographic characteristics of the farmers who volunteered for this extension program are similar. By local standards, the farmers are relatively rich and own a number of parcels of land. The farmers are also typically semi-retired or have part-time employment. All farmers owned land which was unproductive. This 'wasted land' formed the basis of their interest in growing trees. Therefore, this program may have inadvertently targeted a cohort of farmers who represent a minority of the farming population. The implications for a scaled-up extension program of this nature are that the plantation forestry may only be attractive to farmers of a similar socio-economic situation to the farmers targeted here.

Permission to invite farmers to be involved in extension activities was undertaken with the approval of the municipal mayor and by using local government officials to distribute invitations to the community. However, farmers were sourced from only 50% of the barangays in Libagon and 16% of the 45 barangays in Dulag and it is surprising that a wider clientele of farmers was not forthcoming. This suggests that a focus of further investigations should be to confirm that the response rate achieved in this program was a reliable estimate of the total demand for extension assistance.

The summative assessment showed that the farmers maintained a high degree of interest and enthusiasm throughout the program. It is not possible to attribute this attitude to the constructivist approach applied to extension activities which sought to empower farmers by encouraging them to make key decisions about their plantations. However, a didactic approach to aspects of site preparation and fencing would have been inappropriate for many of the sites which farmers chose to plant their trees. Some sites were inappropriate for timber plantations and despite farmers' initial success in establishing trees, failure to realise their commercial expectations from trees on these sites may cause bad publicity for tree growing programs in the future. Conversations with farmers

indicated that they were aware of the shortcomings of the land, however, there were no alternative sites and the farmers were prepared to take the chance that tree growth would be sub-optimal or that harvesting the trees may be difficult. These results indicate that it may be advisable to offer site inspections as part of extension assistance.

The implications of these extension activities for a hypothetically revised and expanded extension program are that a cohort of Filipino farmers exists in Leyte who can be motivated to grow seedlings and establish small plantations on their 'wasted lands'. The farmers are likely to have had little formal training in forest silviculture. Hence, several visits to their farms and nurseries may be necessary to provide on-going support. Highly trained and dedicated extension staff, similar to the people employed for this program, would be a prerequisite. While farmers are unlikely to prioritise tree growing over normal farming activities, the summative evaluation of this program has shown that empathy with farmers' personal situations and responsiveness to their problems may be effective in increasing the adoption of small-scale forestry in Leyte.

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## Appendix A

### Use of an expert group to recommend appropriate silvicultural improvements for small-scale timber plantations in Leyte

In order to achieve a consensus between Filipino and Australian researchers as to an appropriate silvicultural regime for small-scale plantations in Leyte, an ‘expert group’ was formed. This technique is a variation of the ‘devil’s advocate’ or ‘dialectical inquiry’ method where small groups present multiple views to explore alternative options (Herbohn 2002). In this case, the expert group i.e. a forest growth modeller, a silvicultural specialist, a Filipino forester, an economist and the land owner met in February 2005 at six tree farms to propose silvicultural options for the management of the plantations growing on each site. In addition, the group discussed the raising of seedlings at two small-scale nurseries. Their recommendations were modified into eight ‘optional inputs’ which could be recommended to farmers in Leyte as a means of improving timber plantation management. The optional inputs are:

1. site-species matching would be improved if plantings of *Gmelina arborea* were restricted to locations less than 300 m above sea level and *Swietenia macrophylla* was recommended as an alternative species for less fertile sites;
2. growth and form of trees is assisted by selecting seed and wildlings from trees of superior size and form;
3. seedlings should be transplanted from germination trays in a manner which avoids ‘j’ rooting and transplanting shock is minimised if seedlings are grown in an elevated position which prevent roots from growing into the ground;
4. defective seedlings should be discarded and seedlings should be planted out before they become root bound;
5. weed control for a radius of approximately 1 m from newly planted seedlings reduces competition for sunlight and cultivation reduce root competition from weeds, thereby increasing early age growth;
6. fertilising usually assists early age growth;
7. early ‘form’ pruning increases utilisable log length and branch pruning, (as is practised in industrial forests), assists branch stubs to heal; and
8. early-age thinning to remove deformed and smaller trees maximises the diameter growth of the remaining trees.

## Appendix B

### Itinerary of the field tours undertaken in the municipalities of Libagon and Dulag

Activity	Reason for the activity
1. Introductions Farmers were introduced to extension staff at the municipal hall by the mayor or mayoral representative.	Introductory speeches in the municipal hall reassured farmers that the activities were carried out with the support of local government.
2. Tree measuring Farmers were driven to a neighbouring timber plantation and were shown how to measure and value trees.	The exercise had three purposes, firstly as an 'ice-breaker', secondly to familiarise farmers with tree measurement procedures and thirdly to show them the value of a semi-mature plantation. Farmers were allowed to keep the tree measuring instruments - a dress-maker's tape and a printed volume table.
3. Thinning Farmers were driven to plantation which was over-stocked and in need of thinning. In groups, farmers tied tapes around trees which they considered stunted or mal-formed.	Group work generated discussion (and disputes) about which trees were to be thinned.
4. Setting-up a home nursery Procedures for preparing potting mix, filling polybags, setting up a nursery and hardening off of seedlings were demonstrated.	While the activity was presented as top-down technology transfer, the change to passive learning allowed farmers to take notes.
5. Tree planting and site preparation The correct procedure for planting a tree was demonstrated. Farmers were shown an example of tree growth on a site where appropriate site preparation and weed control had been undertaken.	A demonstration of the correct planting technique provided an opportunity to introduce the extension pamphlet 'Growing and Managing Trees on Your Farm'. The purpose of showing farmers intensive site preparation was to allow them to draw their own conclusions concerning the cost/benefit of intensive site preparation.
6. Lunch-time lectures A lecture by a DENR representative provided the legislative background to tree registration.	Although tree registration has little to do with biophysical aspects of growing trees, government requirements to register trees (which are to be sold) are often poorly understood by farmers and the issue is regarded as a barrier to the uptake of small-scale forestry.
7. Visit to a sawmill Sawmill owners or their representatives provided information concerning the price of lumber and the size requirements.	The interviewing with a sawmill owner was to provide guidance as to the likely profitability of plantation grown timber.
8. Farewell Prior to dispersal, closing speeches outlined the arrangements for further extension activities.	Closing speeches reinforced the obligation-free nature of the extension assistance as well as the restriction of this advice to technical advice only.