16. IMPROVING THE MANAGEMENT OF TREE FARMS IN THE PHILIPPINES THROUGH THE USE OF DEMONSTRATION SITES

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As part of ACIAR project ASEM/2003/052, *Improving Financial Returns to Smallholder Tree Farmers in the Philippines*, demonstration sites on existing tree farms have been chosen as the interface between farmers and project outputs in Leyte Province. The demonstration sites have been selected and the owner's cooperation has been obtained. A silvicultural management plan for each site is in preparation. Visits to the demonstration sites by interested farmers will provide the opportunity for them to evaluate tree farming and how it may be incorporated into their farming systems. This paper describes an action research methodology for the development and implementation of extension activities on the demonstration sites.

INTRODUCTION

Research questions addressed in ACIAR project ASEM/2003/052 'Improving Financial Returns to Smallholder Tree Farmers in the Philippines' include a need for farmers to:

- receive greater financial returns from their tree farms
- produce greater volumes of timber per unit of cost, and
- produce timber of appropriate species, log size and quality as desired by the market.

These questions relate directly to project objective 2, which is to assist smallholder tree growers to satisfy market requirement and improve productivity. This paper addresses the three research questions and objective 2, in describing an action research methodology for demonstration sites which will enable farmers to evaluate silvicultural alternatives for tree farms and make considered decisions about incorporating trees into their farming system.

Demonstration sites have been chosen to present project work to smallholders in an effort to increase the adoption and diffusion of sound silvicultural management in tree farms. The demonstration sites will also be used as a link between sawmillers, farmers and government agencies, in particular the Department of Environment and Natural Resources (DENR). The silvicultural background to the current management of tree farms is provided in a companion paper titled 'The Silviculture of Small-Scale Forest Plantations in Leyte the Philippines, a Preliminary Survey' (Baynes, 2005).

RESEARCH APPROACH – PLANNING AND EXECUTION

The general research approach is action research and this is in accord with project intent that a pilot scheme will be developed which brings together buyers and sellers of timber and that existing tree farms will be used as sites to demonstrate the financial benefits of improved management to produce products that better meet market requirements.

Action research, as defined by Kurt Lewin (Clark 1999) can be simplified to planning and reconnaissance, making an intervention and evaluating the results before proceeding to the

next phase. In a slightly expanded approach, McEwan and McEwan (2003), define action research as following a format of:

- analysis
- fact finding
- conceptualisation
- planning
- execution
- evaluation
- and then a repetition of these activities

This is often portrayed as a cycle which parallels Dewey's (Smith 2001) conception of learning from experience. However, Wadsworth (1991), comments that the evaluation phase often occurs all the time throughout the project. McEwan McEwan's format is followed in this paper but with *analysis* grouped with *fact finding* and *conceptualisation* grouped with *planning*. As at March 2005, project workers have progressed these activities to the planning and execution stage.

Enumeration of Tree Farms, and Compilation of a Database

To fulfil the aim of improving the management of tree farms in Leyte, project workers needed to know the number and nature of existing tree farms. In October to December 2004, an extensive investigation was undertaken to locate and describe existing tree farms. The process of locating the tree farms is described in a companion paper "Trials and tribulations in locating tree farmers and sites for research and extension activities" (Cedamon, Bernaldez and Baynes 2005). Seventy six sites were located, of which 8 were chosen as suitable for the demonstration of silvicultural techniques. A global positioning system was used to record the position of each tree farm and a Geographic Information System (GIS), ArcGIS® 8.3 was used to create a master file and map of tree farms. A list of the bio-physical information collected at the tree farms is attached as Appendix A.

Evaluation of the information in the master file and the findings of a preliminary survey on silviculture led to the following conclusions about small-scale tree farming in Leyte. Firstly, there is little if any conscious site-species matching by farmers of the three main commercial species *Gmelina arborea*, *Swietenia macrophylla* and *Acacia mangium.* Secondly, farmers have no clearly defined business plan for the trees and although they often indicated that the trees were intended for furniture or other markets, they had not identified a specific purchaser. None had entered into a sale agreement with a sawmiller for the future purchase of the trees. Thirdly, farmers had little concept of selecting seed from trees of superior phenotype and their knowledge of nursery techniques was rudimentary. Fourthly, farmers had little appreciation of basic silviculture and value adding practices such as pruning trees to produce knot free timber for the furniture market.

These findings led to two conclusions about the needs of small-scale farmers in relation to tree farming. Firstly, expert technical information and opinion concerning propagation of seedlings, silviculture, financial modelling and the results of recent research must be transmitted to farmers. Secondly there is a need to achieve links between growers and sawmillers. These conceptual needs have given a direction for the research; - that the problems identified in the analysis and fact-finding section can be addressed by an intervention which will (via a teaching and extension program) enable small-scale tree farmers to evaluate options for the management of their plantations.

Selection of Demonstration Sites and Organization of Tours

From the master file, three field sites each in northern and southern Leyte have been chosen to demonstrate the silviculture and marketing of tree farms. These sites show different aspects of silviculture and the intention is to offer groups of farmers the opportunity to travel to them as a tour group, either as a 'northern tour' or as a 'southern tour'. For each tour an additional stop has been chosen in which to have lunch, demonstrate nursery techniques and talk with DENR staff.

With the owner's cooperation, two sawmills have been selected at which farmers can ask questions relating to the price, quality requirements and conditions of selling timber. For both tours, the intended itinerary is:

- visit tree farm with older trees to discuss/see thinning and pruning
- visit tree farm with younger trees to discuss/see thinning
- lunch stop at a tree farm where nursery techniques and site preparation will be demonstrated and DENR tree registration requirements explained
- visit tree farm where tree measurement techniques are demonstrated
- visit sawmill to discuss marketing of timber

Expert Group Opinion, Silvicultural Recommendations and Management Plan

Where complex decisions need to be made in natural resource management, the use of an expert group provides complementary opinions which may be used to distil a consensus position. Alternatively, the group may polarize into several opposing positions and this serves to highlight the different points of view of the participants. This technique is a variation of the 'Devil's Advocate' or 'Dialectical Inquiry'" method quoted by Herbohn (2002) where small groups present multiple views to explore alternative options. An expert group was used successfully (DNR 1998) to undertake a land capability analysis in South East Queensland. In that case, expertise from widely differing scientific disciplines was melded into a coherent strategy for land use in a region. In this case, although the area involved was only small farms, there were still differences of view-point caused by different personal socio-economic priorities, that required reconciliation into a coherent plan for the farm.

The use of an expert group is supported in project documentation. Hence, for each demonstration site, an expert group consisting of a forest growth modeller, a silvicultural specialist, a Filipino forester, an economist and the land owner met at each demonstration site to discuss the tree farm, the owners expectations from it and the silvicultural management of the trees. The initial meeting of the expert group took place in February 2005 and a consensus opinion on the optimum future management of the plantation has been recorded. In addition, sample plots of trees will be measured in a measurement program beginning in May 2005. The standing commercial volume of the trees will be calculated. Using guidelines from sawmills, a net present value of the plantation will be calculated and this will be incorporated into a management plan, which will be presented to the owner.

Practical Activities

For one site each on the northern and southern tour, a thinning operation will be arranged to coincide with the first tour group. With the owner's permission and involvement, half of the tree farm will be thinned to the expert group's recommendations. The tour group will be invited to comment. The remaining part of the tree farm will be left untreated to show the "before and after" effect of thinning the stand. At the conclusion of any activity, the site will be cleaned up to the owner's requirements. All thinned material will remain the property of

the owner. DENR requirements concerning the practical operations will be organized through ACIAR staff. If the owner does not agree to actually thin the trees, flagging tape will be used to mark the trees which the expert group considers should be removed, so that tour participants can visualize the change to stand structure.

Use of a 'Constructivist' Philosophy and Monitoring of Tour Activities

A constructivist teaching philosophy will be used for the presentation of activities throughout the tour. This approach avoids the use of a direct "message" which is transmitted to the farmers via traditional teaching. It encourages farmers to make up their own mind and provides a range of activities so that individuals have the chance to learn in their preferred learning style. It also challenges presenters to discern what tour group participants are learning, but also how they are learning it.

Monitoring of the activities through questions, discussion and what message is being transmitted, will be undertaken by ACIAR staff and university students. The reaction of participants and their comments will be recorded by students in an open way.

Owner Permission and Memorandum of Understanding

The owners of the tree farms have given their verbal permission for their farms to be used for tours. However, prior to undertaking the tours, a memorandum of understanding will be signed with each farmer offering them compensation for work time lost. The principal requirement of the memorandum of understanding will be payment for the farmer's time (as required, during the tours) and the requirement that the project be allowed to bring tours to the farm for the duration of the project. Sawmill owners will be asked for permission to bring tours to their sawmill and this will require verbal permission only.

Selection of Farmers and Scheduling of Tours

Selection of farmers to attend the tours will follow the selection of a municipality and barangays within that municipality in which to conduct project activities. Farmers will be offered the opportunity to attend the tours and the invitation will extend to farmers who have existing tree farms and those who are considering planting trees. If the Leyte State University (LSU) bus is used as transport, approximately 15- 20 farmers will constitute a manageable group. The number of tours will depend on demand and evaluation of their effect in promoting small-scale forestry. An initial series of three tours is envisaged, in October and December 2005 and January 2006.

Supplementary Extension Materials

Several extension aids will be developed and will be offered or demonstrated to farmers:

1. a management plan for each demonstration site
2. single tree volume tables for the estimation of the volume of a stand (initial data collection begins in May 2005)
3. a 10 page booklet titled 'Growing and Managing Trees' printed in English, Cebuano and Wiray Wiray
4. financial models of farm forestry (listed as project output 2.2b) will be prepared to assist the calculation of net present value and the internal rate of return for small-scale tree farms. Also, *Simile* (Simulistics, 2003) a graphical modelling program will be used to model growth of the tree farms demonstration sites.
5. three dimensional digital elevation models (DEMs) of Leyte are in preparation. They will show appropriate ecological niches for tree farms planted with the three main

commercial species. The planning stage for the derivation of these models is complete, with the DEMS accessed from the National Aeronautics and Space Administration (NASA) and shapefiles showing soil boundaries and customary land use already mapped by LSU

6. 'micro' nurseries consisting of 50 cell Queensland native tube (QNT) seedling trays.

Follow Up and Provision of QNT Seedling Trays

Subsequent to the tours, field staff will visit individual farmers and discuss their interest in growing trees. In cases where a farmer (or a group of farmers) appear genuinely interested in growing trees, A QNT seedling tray and seed will be supplied to each farmer to encourage them to grow his/her own seedlings. This is not a problem for most Filipino farmers as they are growing plants as part of their normal routine. Use of the seedling trays will be monitored and will form a separate project activity. However, they will be shown to tour participants as a lunchtime activity. The QNT trays and their use in the project is described in a paper titled 'Use of 50 cell seedling trays as extension aids in an ACIAR in Leyte, the Philippines' (Baynes 2005).

Personnel Requirements, and Capacity Building of LSU and DENR Staff

Setting up of the demonstration sites will require approximately 25% of a technician's weekly time for calendar 2005. The follow up activities associated with QNT trays will require six months full time work by a technician. Tour group activities will require one person as "master of ceremonies', one assistant and two student 'helpers'. These helpers will also act as recorders of farmer's comments and opinions and will conduct interviews with the tour group participants.

Training has been provided to LSU staff to operate a GPS and a GIS to create and maintain databases. This is well advanced as at March 2005 and further training in advanced GIS options, tree measuring, stand sampling and tree marking training will be provided in May 2005 and September 2005.

EVALUATION

Intangible project outputs will be the improved understanding, knowledge base and management capability of Filipino farmers as described in project outputs:

- 2.2a Understanding of key factors affecting wood quality and likely yield
- 2.2d An understanding of the social and economic factors to be considered in designing tree farming systems
- 2.4a Higher value products from tree farms
- 2.4b Improved management regimes for tree farms

However, the project requires tangible outputs such as a direct increase in the adoption and diffusion of tree farming as a consequence of project activities.

Crano and Brewer (1973) subscribe to the principle of 'multi-operationism', which involves the recognition that no single qualitative observation provides enough information to define causality between the intervention and the outcome. Instead multiple data collection techniques are required which are as different as possible in irrelevant characteristics but which have a common variable which relates to the outcome. For this part of the project, the success of the project is indicated by the adoption and diffusion of tree farming. However, it would be relatively easy for the project to achieve a temporarily higher planting rate, *per se*,

by subsidising tree planting, without achieving a sustainable increase in small-scale forestry. Therefore evaluation of project activities should be undertaken in three ways.

Firstly, a quantitative assessment of the uptake of forestry will be undertaken. This will be measured as the increased number of tour participants planting trees, the increased area planted to trees and the adoption of native trees for amenity purposes. The most immediate indicator of increased interest in tree growing will be the usage pattern of the micro nursery kits (QNT trays and seeds).

Secondly, a questionnaire will be used at the end of each field day to evaluate which activities were preferred by the audience. The questionnaire will include questions relating to *what* activities participants enjoyed and the relative merits of each activity, using a Likert scale. Participants will also be asked qualitative questions about *why* they liked various activities and *how* they see the activities as being relevant to them.

The third method of assessment will be to monitor sawmiller business activity. At the moment there are only three sawmillers known to project staff in Leyte and an unknown number of illegal or coco-lumber sawmillers. Increased tree planting will have no impact on sawmilling during the life of the project because the rotation length of the plantations is a minimum of ten years. However, improvements to the marketing of trees may have an immediate impact on tree harvesting and conversion. This may induce sawmillers to become interested in the project and it may even indirectly influence their business activities. This will be monitored by interviews and observations.

DISCUSSION AND CONCLUSION

The action research program outlined in this paper is still at the formative stage. A list of things to be done by the end of the first year of the project is attached as Appendix B.

While it is disheartening to note the collapse and near disintegration of forestry and the sawmilling industry in Leyte, the project provides an opportunity to improve the uptake of tree farming from a very low base. Scherr et al. (2004) acknowledge that it is possible that the price of commodity wood may decrease in Asia in the near future. This makes the monitoring and evaluation of the action research more important than ever. The research program which has been outlined above, in conjunction with other project activities, should provide clear directions for the future of the industry. In particular, the evaluation of tour group activities will provide an opportunity to revise project work to accommodate developments in timber prices and markets.

In addition, the tours will be run in a constructivist manner in presenting options and alternatives rather than instruction. This will include an element of choice in the things to do and look at, and other project workers and affiliates (DENR) will be encouraged to participate. Inclusion of other project work at field days and demonstration sites will help to justify the effort and expenditure in setting them up. These occasions are likely to be an important point of interaction between the Filipino public and the project. Therefore, on these occasions, the output of other project workers will be welcomed.

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APPENDIX A. BIO-PHYSICAL AND OWNER RELATED INFORMATION COLLECTED AT TREE FARMS AS PART OF AN INITIAL INVESTIGATION TO LOCATE TREE FARMS IN LEYTE

Where possible, the following information describing tree farms was collected.

- Name of owner
- Willingness of owner to participate in the project
- Willingness of owner to let the tree farm be used as a demonstration site
- Site location (GPS) coordinates
- Site suitability in terms of its “typicality” in relation to surrounding tree farms
- Climatic and soil type
- Area
- Tree species planted
- Age
- Spacing
- Stocking
- Seed source
- Site preparation details
- Fertilising history
- Pruning history
- Tree registration?
- Intended use, reason for planting
- Distance to DENR silvicultural condition
- Value as a silvicultural demonstration plot
- Distance from formed road
- Accessibility to 4WD road for log removal

APPENDIX B. LIST OF ACTIVITIES FOR THE FIRST YEAR OF THE PROJECT

No.	Activity	Completion Date
1	Develop initial database of existing tree farms and potential demonstration sites	Done
2	Select demonstration sites, obtain owner's cooperation and hold first meeting of expert group	Done
3	Develop multi stage probability proportional to size sampling strategy to select municipality, barangays and farmers for project activities	March, 2005
4	Develop extension booklet. Print booklet	April 2005
5	Initiate tree and plot measurement program, beginning with demonstration sites.	Finish training by May 2005
6	Initiate database of 'plus trees' for seedling production	June 2005
7	Develop memorandum of understanding (MOU) document. Negotiate MOUs with tree farmers with regard to and application of 'expert group' silviculture to tree farms. Obtain permission of sawmillers.	June 2005
8	Develop tour group questionnaires and interview sheets	July 2005
9	Import QNT trays.	June 2005
10	Arrange silvicultural treatment (thinning) of demonstration sites	September 2005
11	First field day at demonstration sites (north and south)	October 2005
12	First follow up visits to tree farmers and supply of QNT trays	October 2005