

3. POTENTIAL ECONOMIC IMPACT OF IMPROVING RETURNS TO SMALLHOLDER TREE-FARMERS IN LEYTE: A COST BENEFIT ANALYSIS OF ACIAR PROJECT ASEM/2003/052

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This paper presents the results of a cost benefit analysis of the likely impact of ASEM/2003/052 *Improving financial returns to smallholder tree farmers in the Philippines*. Three main categories of project benefits are identified which coincide with short, medium and long term outcomes, namely: (1) improved returns to existing tree farmers from increased volume and quality of merchantable timber combined with higher stumpage prices flowing from improved market access; calculated to have a net present value of AU\$2.4million, (2) improved returns to existing tree farmers from subsequent rotations of tree farms from increased volume and quality of merchantable timber from better management and prices, calculated to have a net present value of AU\$3.9million, and (3) expansion of the area of tree farms planted due to the higher returns available, and attributable to, project outputs.

INTRODUCTION

The project is designed to provide economic benefits to current tree farmers. The flow-on benefits of higher timber prices, leading to higher incomes of smallholders is potentially significant, especially relative to their current low earnings (i.e. more than 50% of rural households are below the poverty line).

Three main categories of benefits can be identified, namely: (1) improved returns to treefarmers from increased volume and quality of merchantable timber combined with higher stumpage prices flowing from improved market access; (2) improved returns to existing treefarmers from subsequent rotations of tree farms from increased volume and quality of merchantable timber from better management and prices and (3) expansion of the area of tree farms planted due to higher returns available, and attributable to, project outputs. The following sections report a cost benefit analysis for each of these three project benefits.

KEY ASSUMPTIONS AND SOURCES OF DATA FOR CBA

No accurate data exists for many of the key variables. Data were obtained from a number of sources including DENR staff in Region 8, an ICRAF project on Mindanao, data collected by project researchers on a recent visit and LSU faculty. In addition, a number of assumptions have been made in undertaking the analysis of the benefits of improvements in timber prices as a result of project activities. These are outlined below.

Discount rate and time periods

A real discount rate of 5% was used in the analysis. This is the standard rate used by ACIAR in its impact assessment work. Benefits accruing to existing tree farmers from the impact of both better management and higher prices are assumed to occur evenly over the next ten years – the average rotation length assumed for Gmelina – and are discounted

back to present value. A perpetuity has been used to calculate the benefits associated with better establishment and management of subsequent rotations and for the benefits of increased areas of tree farms.

Number, size and nature of tree farms

The 523 tree farms registered in CENRO Maasin and 207 in CENRO Tacloban compared with only 24 in CENRO Baybay and 42 in CENRO Albueria. The recorded area of tree farms in Maasin and Tacloban is 3551 ha, and this area is likely to be larger. According to DENR and LSU staff all four CENROs have large numbers of tree farms within their boundaries despite the differences in registered tree farms. It is reasonable to assume that the recorded tree farms represent less than 50% (and probably much less) of the total tree farms. For the CBA, a conservative estimate of 50% has been used i.e. the total area of existing tree farms has been estimated at 7102 ha over the four CENRO areas. Tree farms data obtained from DENR indicate that Gmelina constitutes the great majority of plantings. As such growth and price data used in the CBA relate to this species. Mahogany is the next most common species planted. There is a skewed size distribution of registered tree farms towards those of a larger size. This is consistent with owners of larger farms being wealthier and more educated and thus in a better position to understand the relevant regulations and deal with DENR. The number and total area of smaller tree farms is very difficult to estimate.

Yield Estimates

While growth models exist for key species such as Gmelina and mahogany, these have largely been developed based on data collected from well managed industrial plantations or in some cases, based on expected growth rather than actual growth. No reliable data exist on yields of timber from tree farms. Current yields appear to be around $7.5 \text{ m}^3 \text{ ha}^{-1} \text{ y}^{-1}$ or even less for Gmelina from smallholder tree farms (Bertomeu 2004, Baynes 2004). This compares with estimates of potential yields of 20 to $30 \text{ m}^3 \text{ ha}^{-1} \text{ y}^{-1}$ from well managed plantations reported in the literature.

Price data

Little information exists on roundlog stumpage prices that smallholders receive – as most sales are based on board feet prices of flitched timber. It is assumed that the current stumpage price is 4 pesos per board ft ($\$43.50 \text{ m}^{-3}$) which is the current price received for Gmelina in Mindanao (Bertomeu 2004, Cramb 2004), although advice from Filipino collaborators indicate that the actual price received by smallholders in Leyte from timber buyers from Cebu is likely to be about half of this amount.

Impact on yield and prices received by existing tree farmers

In the analysis it has been assumed that improved management of existing plantations will result in an average improvement in yield from 7.5 to $10 \text{ m}^3 \text{ ha}^{-1} \text{ y}^{-1}$ and that this will be achieved on *5% of the total area of tree farms* on Leyte. The estimate is reasonable given that staff will make at least one visit to approximately 500 tree farms and extension materials and advice will be provided directly to each of these smallholders. Further smallholders will be reached through radio segments and field days. In addition, a substantial proportion of the total area of registered tree farms is owned by a relatively small number of smallholders. Smallholders with larger tree farms will be targeted for more intensive extension and management advice.

It is assumed that a total of 30% of tree farmers will benefit from higher stumpage prices achieved through accessing more formal markets. The benefit achieved conservatively estimated as being the difference between current estimates of stumpage of 4 pesos per board ft ($\$43.50 \text{ m}^{-3}$) to the 2002 roundlog price ($\$56.40 \text{ m}^{-3}$) reported in the Philippines forest industry statistics on the DENR website. The 5% of smallholders achieving increased yields through better management are included as part of the 30% receiving higher prices.

In addition, it is assumed that the 5% of tree farmers who take up better management practices will receive a 25% increase in stumpage price due to improved log quality.

RESULTS OF CBA

Economic Benefits arising from existing tree farms

The current estimated total annual cash income from Leyte tree farms is \$2.4 million per annum. This is based on a stumpage price of 4 pesos per board foot (\$43.50), which is probably much greater than the actual stumpage price that many smallholders receive. This has been used as the baseline against which the figures reported in Table 1 have been calculated.

Table 1. Financial benefits expected to be realised by smallholders from project activities.

Treefarm intervention	Net Present Value (\$)		
	(1) Immediate incremental benefits to existing tree farmers	(2) Incremental benefits to existing tree farmers from subsequent rotations	(3) Net Income generated by additional plantings of 500 ha per year for 10 years
Additional income from improved management of tree farms (5% of tree farmers affected)	596,267	2,133,268	Not estimated separately
Additional income from higher prices from better market access (30% of tree farmers affected)	<u>1,771,926</u>	<u>1,747,536</u>	<u>Not estimated separately</u>
Total benefit expected to be realised	<u>\$2,368,193</u>	<u>\$3,880,804</u>	<u>\$23,243,870</u>

An improvement in productivity of existing tree farms of just 2.5 m³ ha⁻¹ would produce a net benefit of \$1,544,386 per annum additional revenue flowing to smallholders. The benefits of the project have been estimated based on an improvement in productivity to *only 5% of current area of tree farms* – which equates to \$77,219 additional cash to these smallholders per annum (NPV over 10 years = \$596,267)

Research by ICRAF in Mindinao suggests that sawmillers would be willing to pay a stumpage price of between 1 and 2 pesos per board foot more for straight logs, which are 8 feet long and with a minimum 15-20 cm small end diameter. A 1 peso increase in stumpage is the equivalent to an increase in stumpage of 25% or about \$11 per m³. Project activities directed at improving the quality of logs produced by smallholders are thus likely to result in 25% or greater improvements in stumpage paid to smallholders. If these improvements in market prices were obtained by all smallholders then this would equate to a potential annual increase in income to smallholder tree farmers of at least \$1,147,362. Assuming that only *30% of tree farmers benefit and that the 1 peso increase in stumpage accrues only to the 5% of tree farms that adopt improved management*, this is still a benefit of \$229,472 per annum (NPV over ten years = \$1,771,926).

Economic benefits arising to current tree farmers from improved management to subsequent plantations

If existing tree farmers see the benefits of better management of their current tree farms through higher yield and prices, they will be encouraged to replant these tree farms when they are harvested and to then subsequently manage them better from the outset. This better management is likely to produce significant gains in productivity. An improvement in productivity of existing tree farms of to $15 \text{ m}^3 \text{ ha}^{-1}$, combined with higher quality timber, will produce significant economic benefits to smallholders. Improvement in productivity of subsequent rotations of existing tree farms has the potential to improve cashflows to smallholder by some \$2.5 million per annum. Even if only the 5% of the smallholders who adopted better management of tree farms go onto to better management subsequent rotations the estimated financial benefits will be in the order of \$ 173,743 per annum (NPV over rotations = \$2,133,268). Improvements in market prices translate to a potential benefit of some \$3.5 million per annum to smallholders. Assuming that only *30% of tree farmers benefit from higher prices of subsequent rotations, and that the 1 peso increase in stumpage accrues only to the 5% of tree farms that adopt improved management*, this is still a benefit of \$142,328 per annum (NPV subsequent rotations = \$1,746,536).

Economic benefits arising from increased planting

There are currently about 350,000 ha of non-forest land in Leyte province, much of which is potentially available for agroforestry production. There are about 400,000 households in Leyte Province, although it is unclear what proportion of these are rural households with access to land for forestry. About 60% of smallholders surveyed from four rural communities as part of ASEM/200/088 were found to be interested in undertaking commercial forestry. Currently, there are over 700 registered tree farmers in the province, and many more can be expected to register trees (in anticipation of off-farm timber sale), particularly if stand registration and harvesting approval can be expedited. There appears to be great potential for the expansion of smallholder forestry, and this activity is likely to improve the livelihoods of the rural poor in the province.

Access by farmers to formal markets is likely to lead to an increase in establishment of new tree farms. A modest increase of 500 hectares established per year over 10 years will potentially lead to increased income to smallholders with a present value of some \$23.2 million after allowances have been made for cash outflows and the opportunity cost of tree farms replacing agricultural activities. The per annum cash flows to smallholders associated with an additional 5000 hectares of tree farms is in the order of 2.5 million dollars per annum.

DISCUSSION

The cost benefit analysis reported in this paper has a number of limitations. Importantly, it reports only estimates of direct benefits to smallholders and does not include any estimates of likely flow on impacts to other sectors of the community. For instance, an increase in the area of tree farms established would also result in higher levels of sawmilling activities with resulting increases in employment and capital expenditure. These flow on effects were not included as the aim of the analysis was to assess the impacts on smallholders – which are the focus of the ASEM/2003/052. Nevertheless, flow on impacts are likely to occur and may be at least similar to the direct benefits to smallholders.

A number of additional economic benefits are likely to arise from the project which has not been quantified as part of the preceding analysis. Additional timber resource will be available for on-farm use, for house construction and repair, stakes to support crops, and for use as fuelwood. Increased smallholder and community forestry will reduce the need to spend scarce cash on purchase of these items. A supplementary source of income will arise from sale of fuelwood and charcoal. Tree growing will allow a more diversified production base, and greater creditworthiness, and greater income stability.

The benefits reported in Table 1 are based on *very conservative estimates* of total area of treefarms, timber prices and likely uptake rates by smallholders. There is a high likelihood that the benefits realised will be much higher, although the great uncertainty associated with the likely rate of uptake of project results makes any definitive statement impossible.

Expansion of tree plantings and higher timber prices will lead to welfare improvements from greater self-reliance with respect to timber and fuelwood and greater off-farm earnings from timber sale. Some improvements in housing standard may arise from increased availability of timber. The difficulty of obtaining permits for tree harvest and timber transport will be reduced for tree growers, including those with existing plantations, from reduced time requirements and reduced uncertainty in obtaining permits. Social harmony will be improved from fewer prosecutions for infringing regulations. The increased activity of community organizations can lead to greater shared goals and social cohesion, and to creation of community development funds which can support asset purchase and infrastructure development. The beneficiaries from the project will be mainly smallholders, of which about 50% are currently below the poverty line (Emtage 2004). There will probably be little gender impact, though there may be a reduction in effort needed to collect fuelwood (generally a task undertaken by females).

Benefits could arise from having more settled rural communities, particularly in sloping and upland areas, for which forestry is well suited. The practice of shifting cultivation would be reduced, there could be reduced insurgency activity, and cash income from forestry is sometimes used as a means of affording children's education.

Forestry expansion will provide environmental benefits through watershed protection and siltation of marine habitats. Flood mitigation benefits will reduce loss of life and damage to crops and infrastructure from floods. Greater availability of fuelwood and charcoal will reduce reliance on gas as a fuel for cooking and water heating, with consequent lower CO₂ emissions. Further benefits are reduced pressure for logging of native forests (mostly illegal), and reduced felling of productive coconut palms for cocolumber (with associated erosion impact and encouragement of urban conversion of productive farm land).

REFERENCES

- Baynes, J. (2004), Queensland Department of Primary Industries, Personal Communication, 10 November, 2004.
- Cramb, R. (2004), ACIAR Philippines Landcare Project Researcher, Personal Communication, 11 November, 2004.
- Emtage, N. F. (2004), An investigation of the social and economic factors affecting the development of small-scale forestry by rural households in Leyte Province, the Philippines. Doctoral Thesis, School of Natural and Rural Systems Management, The University of Queensland, Brisbane