

Chapter 8

Can Smallholder Tree Farmers Help Revive the Timber Industry in Deforested Tropical Countries? A Case Study from Southern Philippines

M. Bertomeu

Abstract In many countries of South and South-east Asia trees planted on farms are becoming the most important source of wood. In the Philippines, forestry statistics indicate that since 1999 between 50 percent to 70 percent of the log production came from planted trees because of misdirected policies on natural forests. Today, there are in northern Mindanao 135 active small-scale sawmills (SSS) exclusively supplied with farm-grown timber. These have an estimated log utilization potential of 111,064 m³ year⁻¹ and a sawn timber production potential of 76,596 m³ year⁻¹. However, the Philippine government has not duly acknowledged yet, the importance of timber production by smallholder farmers and their contribution to sustain the wood industry. Existing policies disincentive tree planting and the marketing of farm-grown timber. This chapter explores the importance and the potential of smallholder farmers to sustain the wood industry by characterizing the producers and the timber produced, and describing the structure of the market of farm-grown timber. The study was conducted among farmers in Claveria, northern Mindanao and wood processing plants located in Cagayan de Oro City and its neighbouring municipalities. Evidence is provided that most of the planted trees used by the wood industry in the region and sold in national and international markets are produced on-farm. This shows that smallholder farmers can produce large quantities of timber and efficiently supply local and national markets. The Philippine government and the wood industry sector must recognize the role of smallholder farmers as land managers and efficient producers of many important agricultural commodities, including timber.

Keywords *Gmelina arborea*, mini-sawmill, smallholder, timber trees, tree farming, tree marketing, wood industry

World Agroforestry Centre (ICRAF-Philippines), Rm 16 Khush Hall, IRRI, College, Laguna 4031, The Philippines

Corresponding author: mbergar@unex.es

8.1 Introduction

Since 1950, forests in the Philippines has declined at a rate of 2.2 percent annually. Likewise the forestry sector's contribution to the GDP has dropped from 12.5% in 1970 to just 2.3 percent in 1988 (PCARRD 1994), and 1.3 percent in 1990 (ADB 1994). The Philippines is now a net importer of timber (ITTO 1996). Timber imports are draining the country's foreign currency reserves at a rate of PhP 14 billion per year (Orejas 2002).

For more than three decades, tree planting has been promoted as the solution to the negative effects of widespread forest destruction. However, reforestation efforts have had limited success. Timber License Agreement (TLA) holders, who were required to reforest an area of denuded land equivalent to that selectively logged and to engage in industrial tree plantation, did not significantly contribute to the reforestation efforts due to corruption (Vitug 1993). Large government – and donor-funded reforestation and industrial plantation programs over large tracts of land created social conflicts due to farmer evictions and imposed restriction on farmers' livelihood activities on land they traditionally managed (Carandang and Lasco 1998; Lasco et al. 2001; Nimmo-Bell & Company LTD 2001). In addition, the wood industries associated with industrial forest plantations have struggled for economic survival (Inquirer 2000). As with other tree crops, such as coffee, cacao and rubber, scale economies may not exist in the production of timber since neither large-scale machinery nor central management is required for the production of these tree crops (Hayami et al. 1993; Barr 2002). Social forestry programs and initiatives that started in the early 1970s have not been more successful (see also Snelder and Lasco, Chapter 1, this volume).

In contrast, as a result of favourable market conditions and the promotion of a tree planting culture among upland farmers during the past two decades, small-holder tree farming has emerged as a profitable farm enterprise (Bertomeu 2006), and as a viable alternative to industrial forest plantations and costly government-driven reforestation (Garrity and Mercado 1994; Pascicolan et al. 1997). Paradoxically, small-scale tree farms in the Philippines were first promoted in the early 1970s under the smallholder tree farming contract scheme of the Paper Industries Corporation of the Philippines (PICOP Inc.), one of the first major industrial forest plantation initiatives established to supply a pulp and paper mill at Bislig, Surigao del Sur.¹ Tree farms developed under this scheme quickly spread. In 1997, there were 15,000 ha of tree farms located nearby PICOP's mill site and another 29,000 ha further away but selling wood to PICOP (Jurvélius 1997). The high price of timber and the demonstration effect of PICOP's tree farming scheme, as well as the development of other successful tree planting programs, supported the spread of tree farming throughout the country.

¹From 1972 up to 1994, PICOP established in its forest concession area 33,200 ha of *Paraserianthes falcataria* and *Eucalyptus deglupta* (ADB 1994; Jurvélius 1997).

Unfortunately, tree farming has been promoted on the promise of huge economic returns,² based on overoptimistic yields of fast-growing trees in favorable tropical humid conditions and unrepresentatively high timber prices at specific times and locations.³ In the past few years, lower than expected returns from tree farming, particularly with *Gmelina arborea* (hereafter referred to as gmelina) and *Paraserianthes falcataria* (hereafter referred to as falcata), has caused disenchantment among upland farmers (Caluza 2002). As planted trees reached harvestable age, prices fell drastically due to market saturation. In 1997, the price of gmelina on stumpage averaged PhP 4.0 per board foot (bd.ft.), (i.e., US\$33 m⁻³), a 60 percent decline with respect to prices in the early 1990s. Moreover in the smallholder context, timber yields may be lower than predicted as a result of adverse soil conditions and farmers' poor management practices (e.g., excessive pruning and lack of thinning).

In spite of these setbacks, interest in tree farming is still high. A field survey conducted in the upland municipality of Claveria, northern Mindanao, among 112 randomly selected farmers (sampling fraction ranging from 1.3 percent to 1.6 percent), of which 75 percent had planted timber trees, revealed that 55 percent (62 farmers) intended to plant timber trees in the near future. Of these, 37 farmers were non-planters and thus farm forestry is new to them, while the remaining 41 percent (25 farmers) were already tree planters who wanted to expand their plantations (Bertomeu 2004). In addition to the benefits provided to rural families, including fuelwood, construction materials, protection against erosion, shade and shelter, farm-grown trees are taking an increasing share of the timber industry and trade in the Philippines. The existence in Region 10 of northern Mindanao of 135 small-scale sawmills (SSS) exclusively supplied with farm-grown timber (DENR 1996b) demonstrates the extent and importance of tree farming in the region and provides evidence that growing timber trees on farms is still considered a viable livelihood alternative and an activity with an importance to the wood industry sector.

In many countries and regions of South and South-east Asia trees planted on farms are becoming the most important, if not the only, source of timber. In Punjab, India, farm trees account for 86 percent of the province's growing stock. In Sri Lanka, "trees outside the forest" represents over 70 percent of industrial wood, and in Pakistan trees on farms account for 23 percent of all timber growing stock. Even in Indonesia, a country that still has vast forest resources, some 20 percent of the total wood consumed is derived from trees outside the forest (FAO 1998). In the Philippines, increasingly larger volumes of timber consumed come from planted trees as well. Most of these are grown on small farms in the sloping uplands. This paper describes how the marketable surplus of timber produced by farmers is reaching the market, the structure of this market and the end uses of farm-grown timber

²The slogan "Kahoy karon, bulawan ugma" (Trees today, gold tomorrow) popular among Philipinos in northern Mindanao exemplifies the expectations put on tree farming.

³A local newspaper reported that 1 ha of *Eucalyptus deglupta* could yield "Ph P 14,000 per tree or Ph P 10.5 million per hectare" (Fonollera 1996).

in the province of Misamis Oriental in northern Mindanao. Then, it shows the importance of farm-grown trees to sustain the regional wood industry and outlines timber producers' concerns about the future of the industry. By providing evidence of the contribution of farm-grown trees to the wood industry, I aim to highlight that trees planted on small farms, far from being anecdotal, has the potential to be a viable and reliable supply for the wood industry.

8.2 Materials and Methods

The study was conducted among smallholder farmers in Claveria, Misamis Oriental, and wood processing plants located in Cagayan de Oro City and its neighbouring municipalities. Cagayan de Oro is the capital city of Misamis Oriental, one of the four provinces of Region 10 in northern Mindanao.⁴ Although the forestry sector output in the region has been declining in recent years due to depletion of the resource and the reduction in legal Timber License Agreements (TLA) (Louis Berger International 1999), the forest- and wood-based industry is the second most important industry sector after the processed foods and beverages (Provincial Capitol 1997). According to the Cagayan de Oro – Iligan Corridor Master Plan, in 1998 the Agriculture, Fishery and Forestry sector was an important contributor to the Corridor's economy, accounting for a combined share of PhP 3.3 billion or 18 percent of the Gross Service Area Product (GSAP) of the two provinces of Misamis Oriental and Misamis Occidental. Consequently, the establishment of industrial crops, such as forest trees, rattan and rubber, is one of the economic sectors proposed for development (Louis Berger International 1999). The Department of Environment and Natural Resources (DENR) reported that in 1996 there were, in Region 10, six sawmills, five re-sawmills, three veneer and plywood plants and 135 mini-sawmills. Wood sources to these industries are TLAs from eastern and southern Mindanao, planted trees from Region X and adjacent regions, and imported timber from USA, Malaysia, UK and Singapore (DENR 1996b).

In the year 2000, 17 farmers who harvested trees were interviewed and their plantations surveyed. From these, 14 are commercial tree farmers as they sold their trees to middleman or sawmills, whereas the other three used their timber for house construction. Only the data from commercial tree farmers was included in the calculations reported below. In addition, 16 owners of mini-sawmills and three managers of large-scale wood industries of Misamis Oriental were interviewed. The survey technique consisted of structured and semi-structured questionnaires with major topics of discussion concerning timber supply and demand, processing and production, uses of farm-grown timber, marketing system, constraints to the industry

⁴Region X of northern and central Mindanao is composed of the provinces of Misamis Oriental, Misamis Occidental, Bukidnon and Camiguin.

and trends, and future expectations. Important information was also gathered during several study tours to wood processing plants and training and research activities conducted in collaboration with tree farmers and a plywood company at the municipality of Tagoloan, Misamis Oriental. These activities were part of the Landcare agroforestry extension project funded by the Spanish Agency for International Cooperation (AECI) and implemented by the World Agroforestry Center (ICRAF). Additional data on timber trade and marketing have been collected from published reports, secondary sources, the National Statistics Office and local agricultural statistics.

8.2.1 *Limitations of the Study*

I used the best statistics on timber production available from several sources, including local governments, national agencies and international organizations. However, because of the lack of transparency, so common in the forestry sector, and the absence of proper market information systems, there are probably large discrepancies between the actual amount on timber produced, traded and consumed and those reflected in the statistics. For example, there are no estimates of the large volumes of timber locally consumed in raw form (i.e., as poles, posts, or lumber), or processed (e.g., furniture, wooden crafts etc.). Also, although small-scale wood processors know well the production capacity of mini-sawmills, including recovery rates, most of them did not keep records of total production or were reluctant to share this information. It should be noted as well that given the species and the size and quality of the logs produced, farm-grown timber cannot be a substitute for wood originating from large diameter and quality logs coming from natural forests. Therefore, comparisons between farm-grown timber and other timber produced, traded or consumed should be interpreted with caution.

8.3 Results

8.3.1 *Characterization of Commercial Tree Farms and Farmers*

The average farm area managed⁵ by the commercial tree farmers interviewed was 5.7 ha, with an average number of trees in their plantations of 995 (ranging from a minimum of 30 to a maximum of 4,000 trees) and an average number of trees harvested and sold of 232 (with a minimum of nine trees and a maximum of 2,000). Considering the number of trees harvested and the total number of board feet as

⁵Farm area managed = farm area owned + farm area rented.

reported by the farmer, the average volume per tree is 46 bd.ft. (i.e., approximately 0.1 m³ per tree). Although studies conducted in Claveria show that small farm size do not prevent timber tree planting (Bertomeu 2004), results of this survey indicate that smallholders with larger farms (i.e., above the average size in Claveria of 2.5 to 3.0 ha), are more likely to be market-oriented timber producers. The number of trees sold indicates that the size of viable, small-scale commercial plantations varies widely. Among the 14 commercial tree farmers, nine had sold less than 100 trees and five of them less than 30 trees. When asked about the minimum number of mature trees that a small-scale plantation should have to be commercial, sawmill managers indicated that a tree plantation is considered commercial as long as the truck used to transport the logs can be fully loaded with logs of the size required. Accordingly, to be commercially viable small-scale tree farms should have from 11 to 14 m³ (for the smaller trucks) up to 18 to 20 m³ of timber (for the larger trucks).

8.3.2 *Supply, Demand and Uses of Farm-Grown Timber*

From the late 1980s and throughout the 1990s an increasing number of SSS were established in Misamis Oriental for the processing and commercialisation of farm-grown timber stocks. According to the DENR, in 1996 there were 135 SSS in Region 10 of northern Mindanao (DENR 1996b). All the SSS are mainly supplied with logs of gmelina and falcata. Other species milled, though in much smaller volumes, include *Acacia mangium* (mangium), *Swietenia macrophylla* (mahogany), *Eucalyptus deglupta* (bagras), and *Spathodea campanulata* (african tulip). Wood processors indicated that trees are mostly grown by smallholder farmers, although sometimes falcata originates from the large-scale forest plantations of eastern Mindanao.

All farmers interviewed sold their trees on stumpage (i.e., standing “on the stump”). Fifty percent of the SSS owners interviewed look themselves for plantations, buy the trees standing “on the stump”, and haul the logs to the sawmill. For the other 50 percent, trees are harvested and delivered to the sawmill by farmers or middlemen. Gmelina is mostly purchased from municipalities within the province of Misamis Oriental, whereas falcata is bought in truckloads coming from localities of the neighbouring provinces of Agusan and Surigao, as far as 200 km. This shows that at current timber prices farm forestry is profitable even in areas far away from the sawmills.

About 50 percent of the SSS owners reported slight fluctuations in the supply and demand of farm-grown timber throughout the year. There are more trees for sale during the dry season (i.e., from February to June), as this is the agricultural slack period and farmers need income for household consumption and to pay school fees. Moreover, during the dry season farms are more accessible and hauling and transport of heavy logs easier. The rest of the year, farmers are busy planting and harvesting field crops and therefore, it is more difficult to find timber trees for sale. By contrast, demand is lower during the first semester of the year and higher

in the second as consumers have more cash to spend towards the end of the year due to extra payments and the harvest of agricultural crops. However, these slight fluctuations in log supply and timber demand do not lead to fluctuations in the price of timber.

Figure 8.1 depicts the most important transformations and end uses of farm-grown timber in Misamis Oriental. The great bulk of logs produced by farmers are sawn in SSS and either sold for further processing to medium- and large-size wood industries, or sold to retailers (lumber yards, carpentries, furniture shops) and individuals. Wood industries use falcata planks and veneer as core stock in the production of plyboard (also called block board) and plywood. Gmelina is mostly used for furniture, house construction (window jams, doors, floor and wall tiles) and wooden crafts (Photo 8.1). Low quality wood and small size pieces are used for pallets, crates and wooden boxes. Due to the smaller size and lower quality, farm grown timber cannot be a substitute for timber originating from natural forests. However, according to the respondents, several premium timber species planted on farms, such as mahogany, have the potential to capture the market niche currently under

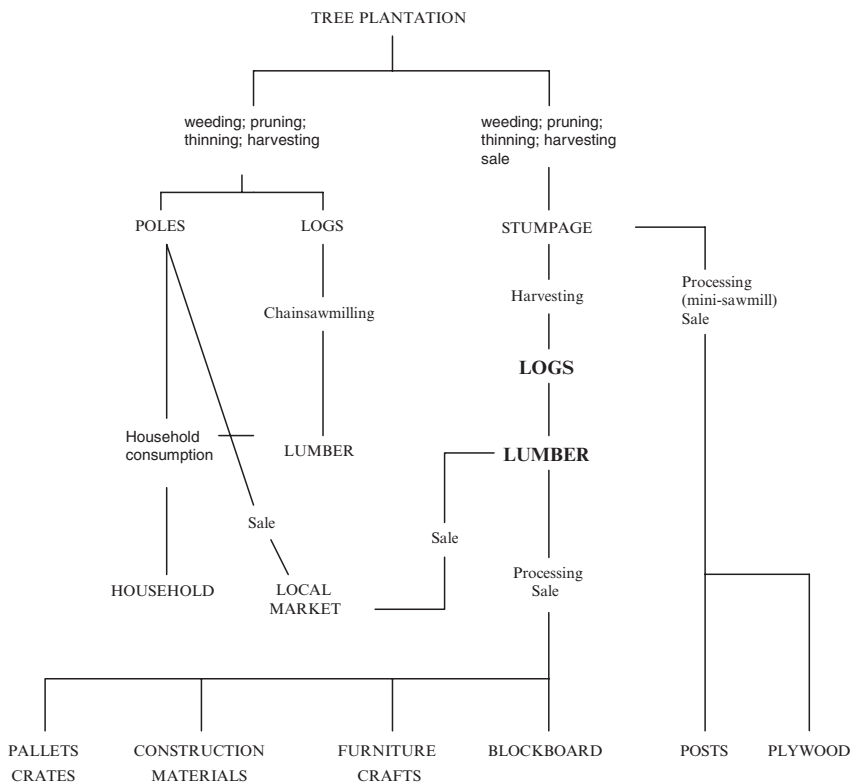


Fig. 8.1 Production and marketing system of farm-grown timber in Misamis Oriental, Philippines: producers’ decisions, product transformation and end use



Photo 8.1 *Gmelina arborea* planks drying and finished product on a smallholder's compound in the Philippines (©DJ Snelder)

the premium commercial timbers (vener and large size, quality wooden planks). This is already happening in central Philippines, where mahogany trees planted by small-scale farmers are sold to the wood industries of Cebu, the second largest city of the Philippines (Yao et al. 2005). Unfortunately, mahogany stocks growing on farms in northern Mindanao are not sufficiently large yet so as to supply the wood industries in this region with sufficient quantities of timber.

In the early 1990s, the stumpage price of farm-grown *gmelina* timber was high, varying between PhP 7.0 to 9.0bd.ft.⁻¹. But since 1997, the average price is only PhP 4.0bd.ft.⁻¹. Tree planters have a good understanding of the reasons for the current decline in the price of farm-grown timber. Farmers reported that the market is likely to be saturated as plantation stocks rapidly increased when prices were high. In addition, lower demand for low quality timber is also a contributing factor. Although some farmers indicated market control by exploitative middlemen as the reason for the current low timber price, there is no evidence of the presence of a timber cartel since good market access and the existence of many buyers make the trade of farm-grown timber fairly competitive. According to the owners of SSS interviewed, the price has declined because of the existence of large stocks of undersized and low quality timber. SSS require logs with a minimum length of

4.0 ft (although 3.0 ft can be accepted but at an even lower price) and 12 cm small-end diameter. However, 37 percent of the respondents reported that they are willing to pay farmers a stumpage price PhP 1.0 to 2.0 bd.ft.⁻¹ higher for straight logs with 16 to 18 cm small-end diameter and 8.0 ft long. Timber planks of this size are used for furniture and house construction.

Other factors influencing the price of farm-grown timber are the size and quality of the log, which ultimately determine the end use. Sawn timber used for furniture and house construction is graded into three categories: A (planks 8.0 ft long without knots); B (6.0 ft long with some knots); and C (4.0 ft long, knotty). Prices vary accordingly: PhP 11.0 or 12.0 for category A; PhP 9.0 or 10.0 for category B; PhP 7.0 or 8.0 for category C. For veneer, timber price also depends on log size. In the year 2002, prices ranged from PhP 3.0 bd.ft.⁻¹ for logs 26 to 28 cm in diameter, to PhP 6.0 bd.ft.⁻¹ for logs with diameter 60 cm and larger. There is no price premium for quality timber that is bought by truckload. In the region, there is no active cooperative or local organization engaged in timber marketing. This is unfortunate as farmers and sawmill owners interviewed reported that the price of round timber at mill gate is around 50 percent higher than the current average stumpage price of PhP 4.0 bd.ft.⁻¹. As Anyonge and Roshetko (2003) indicated, tree growers would certainly benefit from the development of cooperatives and farmer groups that transfer economies of scale of timber production to smallholdings by facilitating the marketing of farm-grown timber. However, the 16 SSS surveyed had a total of 65 operational mini-sawmills⁶ (56 percent of the SSS operates only one or two mini-sawmills and 32 percent have a capacity of three or four mini-sawmills). According to the survey respondents, in a regular eight hour working day and with an average recovery rate of 45 percent a mini-sawmill produces between 700 to 1,000 bd.ft. of sawn timber of gmelina or 1,000–1,600 bd.ft. of falcata. Considering that of the 16 SSS visited only 45 percent operate continuously and using an average production of 1,000 bd. ft. of sawn wood per mini-sawmill per day, with the existing sawmill capacity (135 mini-sawmills) an estimated 45,000 to 53,617 m³ of farm-grown sawn wood was produced every year in Region 10 since 1996. And with the reported average recovery rate of 45 percent, a conservative estimate of smallholder log production in Region 10 is that of 65,250 to 77,745 m³ year⁻¹. Assuming a continuous operation of mini-sawmills, the potential annual log utilization would be 111,064 m³ year⁻¹, and the potential sawn timber production 76,596 m³ year⁻¹. If compared to the available statistics of the sawn wood exports from the Cagayan de Oro port (Table 8.1) and considering that, unknown, but probably large volumes of sawn timber are consumed locally, we can conclude that these are very conservative estimates of the contribution of smallholder farmers to the wood industry in the region. Nevertheless, it represents about 10 percent to 14 percent of the domestic consumption of tropical sawn wood timber in 1996 (539,000 m³) reported by ITTO (1996).

⁶Mini-sawmill is a sawmill consisting of a single head rig with a flywheel diameter not exceeding 106 cm, a band saw blade with thickness not exceeding 3.0 mm and width of not more than 27 mm, with or without a carriage, and a daily rated capacity of no more than 18 m³ or 8,000 board feet of lumber per eight hour shift (DENR 1996a).

Table 8.1 Exports of falcata sawnwood from Cagayan de Oro Port, The Philippines (Regional Statistical Year Book 2000, Neda Region X and 1995–96 Misamis Oriental Provincial Socio-economic Profile)

Year	Volume ^a (m ³)	Value (million PHP)
1994	22,863	87,218
1995	30,971	142,614
1996	42,361	237,924
1997	25,175	165,421
1998	1,795	43,144
1999	113	1,127

^aVolume adjusted from weight assuming the conversion factor for sawn wood of 1.43 m³ ton⁻¹ (ITTO 1996)

Smallholder tree farming enterprises are also contributing substantially to employment generation in the region. In the SSS surveyed, for every mini-sawmill an average of five workers (considering part time and full time workers) are employed in the various activities involved, from tree harvesting and processing to business management. Thus, around 675 people may be directly employed by the mini-sawmill industry in Region 10 in 1996. Even if this estimate does not consider the many people involved in associated activities such as transporting and further processing and marketing, it represents six percent of the work force of all processing mills (i.e., sawmills, veneer and plywood mills) in the country as reported by ITTO (1996).

Planted trees also represent a large percentage of the national and international production and trade of tropical timber in the Philippines. According to ITTO (2001), “as of 1999, logs coming from plantations made up to 70 percent of the log production of 712,000 m³” (i.e., 500,000 m³ of the total log production comes from planted trees). In 2000, log production registered an increment of 9.6 percent over the previous year primarily due to harvest of planted trees within private land (Dy 2002). And in 2002, log production was 398,196 m³, of which 46 percent was falcata, 13 percent gmelina and 4 percent mangium (ITTO 2003). Considering that in the Philippines sawn wood exports are restricted to those arising from planted trees or from imported logs (ITTO 1996), between 1995 to 1998, 40 percent to 45 percent of the total sawn wood exports would have come from planted falcata trees (Table 8.2). This figure is probably higher considering that eight owners of SSS and medium size wood industries interviewed reported exporting sawn timber of gmelina to other Southeast Asian countries. Although timber trade statistics do not specify whether logs originate from industrial forest plantations or from smallholder farms, responses and data reported in this study support the hypothesis that a large percentage of the logs traded are produced on small farms.

The Philippines, like other former timber exporters in Asia such as Thailand and Vietnam, is now a major importer of timber. In the year 2000, imports accounted for 40 percent of the total supply of logs, 70 percent in lumber and 20 percent in plywood and veneer (Dy 2002). Until recently, growing domestic demand of timber has

Table 8.2 Planted trees such as *Paraserianthes falcataria* (falcata) account for a large percentage of the total sawn wood exports of the Philippines

Year	Volume exported (x 1000m ³)		
	Total ^a	Falcata ^a	%
1994	38	47	
1995	84	44	52
1996	145	67	46
1997	141	63	45
1998	41	15	37
1999	69	4	6
2000	120	15	13
2001	97	2	2
2002	91	10	11

^aSource: ITTO Annual review and assessment of the world tropical timber situation

been met, to a large extent, by imposing low tariffs on imported logs (three percent) and protecting wood processors from international competition by high tariffs on sawnwood (30 percent) and veneer and plywood (50 percent). But local wood processors interviewed showed concern about competition from imported timber, as the Philippine government is required to substantially reduce tariffs in compliance with the ASEAN Common Effective Preferential Tariff (CEPT) Agreement⁷ signed in 1992 (Shimamoto 1998). Encouraged by new processing technologies that allow timber production from small diameter trees and the use of a wider range of species, the wood industry is realizing that farm forestry has the potential to be an important source of cheap timber. Domestic producers have begun actively looking for other tree alternatives in order to meet domestic demand and reduce their present dependence on imported timber. During the last few years, a plywood company near Cagayan de Oro City has been testing the veneering potential of more than 30 tree species commonly-grown on farms. Of these, five native pioneers, *Endospermum peltatum* (gubas), *Artocarpus blancoi* (antipolo), *Octomeles sumatrana* (binuang), *Duabanga moluccana* (loktob) and *Trema orientalis* (anabiong), were identified as suitable for face and back veneer and several others for core stock. In 2001, they also satisfactorily tested, in collaboration with tree farmers from Claveria and Lantapan (Bukidnon), the veneering properties of three exotic species recently introduced for farm forestry, *Maesopsis eminii* (mosizi), *Eucalyptus robusta* and *Eucalyptus torrelliana*. For several years, the company has been already using falcata for core veneer, again demonstrating the market potential of trees grown on-farms. These initiatives led by farmers and the industry to find new tree alternatives are an indication that facilitating access to seeds and seedlings of a wider range of tree species could prove to be a simpler and more successful reforestation strategy that would satisfy the needs of farmers, the industry and the society.

⁷Signatories of the agreement are required to reduce tariffs to 20 percent within five to eight years from 1993 and to zero to five percent thereafter within a seven year period (Shimamoto 1998). Current tariffs are seven percent for sawn wood and veneer and 15 percent for plywood (ITTO 2003).

Domestic demand for sawn wood in the Philippines for the year 2010 has been estimated at 1.646 million cubic metres, with a log requirement to meet this demand of 3.418 million cubic metres (Sanvictores 1994). If fast growing trees were planted on small farms yielding just $6.0\text{m}^3\text{ ha}^{-1}\text{ year}^{-1}$ on rotation periods of 10 years, the log requirement to meet domestic demand for sawn wood in 2010 could be produced if 569,667 ha of tree farms had been established in the year 2000. This represents just a small fraction of the land potentially available for agroforestry and farm forestry in the Philippines.

Unfortunately, existing policy disincentives constrain the establishment of tree farms and the use of trees by the wood processing industry. Although, recent legislation exempt owners of planted trees from paying forest charges, farmers are required to apply for a Certificate of Registration of the plantation and a Certificate of Verification to show that trees are ready to be harvested (GOLD 1998; DENR 1999). Moreover, at the village level a lot of confusion exists on whether certain fees have to be paid or not. Field inquiries revealed that many farmers are required to pay harvesting fees to local officials, although there is no legal basis for such fees. The owners of SSS interviewed also complained about the many restrictions and permits required to operate. These include, in addition to the licenses required to any business or industrial activity, harvesting permits from village governments, transport permit (Certificate of Origin) (Andin 2002) and frequent road check points by the DENR, and probably further restrictions to the establishment of SSS as stated in the general objective of the Five Year Mini-sawmill Rationalization Plan (DENR 1996b). Incentives to encourage forest plantation establishment, like income tax, holidays tax and duty free importation of capital equipment, and exemption from contractors' tax (ITTO 2001), are, however, better suited for industrial plantations and have limited application to smallholder farmer conditions. By giving large industrial plantations such incentives, they function as *de facto* disincentives for smallholder timber producers. What is required in forestry policy is a paradigm shift that recognizes the legitimate role of smallholder farmers as contributors to national timber production (Van Noordwijk et al. 2003).

8.4 Conclusions and Recommendations

In the past two decades, small farms in northern Mindanao have generated a significant marketable surplus of fast-growing timber trees and viable farm forestry industries have emerged in the region as a result. The volume of farm-grown timber harvested, processed and traded in the past few years, proves the success of smallholder upland farmers in tree growing and marketing, demonstrating that they can produce large quantities of timber in their smallholdings and efficiently supply local, national and international markets.

However, current produce is not a practical substitute for timber products requiring large diameter and quality logs. Therefore, the Philippines are still largely dependent on imported timber to meet its increasing domestic demand. Wood processors have

been protected from international competition by high tariffs on imported processed timber. But presently, in compliance with signed international agreements, the government is required to substantially reduce tariffs on imported timber. The wood industry is realizing that farm forestry has the potential to contribute to import replacement but several constraints remains that limit further development of the wood industry based on locally produced farm-grown timber. First and foremost, the Philippine government should remove policy restrictions curtailing the use of planted trees and provide incentives appropriate to smallholder farmers. At the same time, farm forestry extension programs should provide quality germ-plasm, promote the use of a wider range of tree species, and invest in training programs aiming at improving management and marketing. The Philippine government and the wood industry sector must recognize the role of smallholder farmers as land managers and efficient producers of many important agricultural commodities, including timber.

Acknowledgements My most sincere gratitude to the Landcare farmers from Claveria and Lantapan, and the people at VICMAR for their enthusiastic collaboration in this study. To the Spanish Agency for International Cooperation (AECI) for supporting the development of smallholder farming systems in the Philippines.

References

- ADB (1994) Forestry Sector Study of the Philippines. Asian Development Bank, Manila
- Andin NA (2002) Forestry programs and policies in support to Tree Farming. Paper presented at the Second National Tree Farmers Congress, 11–13 July 2002, Butuan City, The Philippines
- Anyonge CH and Roshetko JM (2003) Farm-level timber production: orienting farmers towards the market. *Unasylva* 212(54): 48–56
- Barr C (2002) Profits on Paper: The Political Economy of Fiber, Finance and Debt in Indonesia's Pulp and Paper Industries. Centre for International Forestry Research (CIFOR), Bogor, Indonesia
- Bertomeu M (2004) Smallholder Timber Production on Sloping Lands in the Philippines: A Systems Approach. World Agroforestry Centre, Southeast Asia Regional Research Programme
- Bertomeu M (2006) Financial Evaluation of Smallholder Timber-Based Agroforestry Systems in Claveria, Northern Mindanao, The Philippines. *Small-scale Forest Economics, Management and Policy* 5(1): 57–82
- Caluza D (2002) Farmers Quit Planting Gmelina in Apayao, Women's Study Says. *Philippine Daily Inquirer*, Manila, 1 April 2002
- Carandang WM and Lasco RD (1998) Successful reforestation in the Philippines: technical considerations. In: *Mega Issues in Philippine Forestry: Key Policies and Programs*. Forest Development Center, UPLB, Laguna, The Philippines, 49–59
- DENR (1996a) Additional Guidelines Governing the Issuance of Permits to Establish and Operate Mini-sawmills. DENR Memorandum Order No. 96–09. DENR, Quezon City, The Philippines
- DENR (1996b) Five Year Mini-Sawmill Rationalization Plan for DENR Region 10. DENR Region 10, Cagayan de Oro City, The Philippines
- DENR (1999) Supplemental Guidelines Governing the Registration, Harvesting, Transport and Marketing of Timber by Products Coming from Private Plantations Within Private Lands or

- Tax Declared Alienable or Disposable Lands. DENR Memorandum Circular Order No. 99–20. DENR, Quezon City, The Philippines
- Dy RT (2002) The Philippine wood industries. Paper presented at the Second National Tree Farmers Congress, Butuan City, The Philippines, 11–13 July 2002
- FAO (1998) Asia-Pacific Forestry: Towards 2010. Executive Summary of the Asia-Pacific Forestry Sector Outlook Study. FAO, Rome
- Fonollera C (1996) Agro-forestry Micro-enterprises to Reforest Watersheds. *Gold Star Daily*, Cagayan de Oro, The Philippines, 12 September 1996
- Garrity DP and Mercado A (1994) Reforestation through agroforestry: market driven small-holder timber production on the frontier. In: Raintree JB and de Francisco HA (eds) Marketing of Multipurpose Tree Products in Asia. Proceedings of an international workshop held in Baguio City, The Philippines, Bangkok, Thailand. Winrock International, 265–268, 6–9 December 1993
- GOLD Project (1998) Tree Farming Sourcebook. Governance and Local Democracy Project (GOLD) and the Palawan Tropical Forestry Protection Program, Provincial Government of Palawan, The Philippines
- Hayami Y, Quisumbing MAR and Adriano SL (1993) Toward an Alternative Land Reform Paradigm: A Philippine Perspective. Ateneo de Manila University Press, Quezon City, The Philippines
- Inquirer (2000) PICOP to Shut Down Forestry Division. *Philippine Daily Inquirer*, Manila, 5 August 2000
- ITTO (1996) Annual Review and Assessment of the World Tropical Timber Situation 1996. International Tropical Timber Organization (ITTO), Yokohama, Japan
- ITTO (2001) Annual Review and Assessment of the World Tropical Timber Situation 2001. International Tropical Timber Organization (ITTO), Yokohama, Japan
- ITTO (2003) Annual Review and Assessment of the World Tropical Timber Situation 2004. International Tropical Timber Organization (ITTO), Yokohama, Japan
- Jurvélius M (1997) Labor-intensive harvesting of tree plantations in the southern Philippines. In: Tan LC and Durst PB (eds) Forestry Harvesting Case Study No 9. FAO, Bangkok, Thailand
- Lasco RD, Visco RG and Pulhin JM (2001) Formation and transformation of secondary forests in the Philippines. *Journal of Tropical Forest Science* 13: 652–670
- Louis Berger International Inc. (1999) Cagayan de Oro-Iligan Corridor Master Plan. Volume I - The Report. Technical Advisory Services for the Philippine Assistance Program Support, Republic of the Philippines
- Nimmo-Bell & Company LTD (2001) Bukidnon Forests Incorporated. Sustainable Forestry in the Philippines. Bukidnon Forests Incorporated (BFI), January 2001
- Orejas T (2002) DENR to Start Cloning Native Trees. *Philippine Daily Inquirer*, 4 April 2002, Manila
- Pascicolan PN, de Haes HAU and Sajise P (1997) Farm forestry: an alternative to government-driven reforestation in the Philippines. *Forest Ecology and Management* (99): 261–274
- PCARRD (1994) Status of Industrial Timber in the Philippines. Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCARRD) and the Department of Science and Technology (DOST), Los Baños, Laguna, The Philippines
- Provincial Capitol (1997) 1995–1996 Provincial Socio-economic Profile of Misamis Oriental. Provincial Capitol, Cagayan de Oro City, The Philippines
- Sanvictores EF (1994) Demand for industrial timber in the Philippines. In: Status of Industrial Timber in the Philippines. PCARRD and DOST, Los Baños, Laguna, The Philippines, 14–30
- Shimamoto M (1998) Chapter 4: Forest resources and the forest products industry in the Philippines. In: A Step Toward Forest Conservation Strategy (1). Interim Report 1998, IGES Forest Conservation Project. Available at <http://www.iges.or.jp/en/nc/phase1/interim-contents.htm>
- Van Noordwijk M, Roshetko JM, Murniati M, de los Angeles M, Suyanto C, Fay C and Tomich T (2003) Agroforestry is a form of sustainable forest management. Paper presented at the

UNFF Inter-sessional Expert Meeting on the Role of Planted Forests in Sustainable Management, New Zealand, March 24–30, 2003

Vitug MD (1993) *The Politics of Logging. Power from the Forest*. Philippine Center for Investigative Journalism, Manila

Yao CE, Bertomeu M and Cordero G (2005) A rapid assessment of farm forestry in Bohol: characterization, constraints and recommendations. *The future of the Sierra Madre: responding to social and ecological changes. Proceedings of the 5th International Conference on Environment and Development, CVPED, Tugearao, The Philippines*, 111–121