

Agroforestation: Getting Smallholders Involved in Reforestation

Market-driven Small-holder Timber Production on the Frontier

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The Conventional view

It is commonly perceived that small-scale farmers must assume a very short term perspective in their farming practices due to poverty, family food needs, and lack of access to investment capital. For migrant farmers on the agricultural frontier, a very short time horizon is assumed. In Southeast Asia these pioneer farmers are typically found on the margins of protected forests, and in the grasslands dominated by *Imperata cylindrica* (*alang-alang*, *cogon*). The conventional paradigm is that they practice annual cropping for food security by converting protected forests to shifting agriculture, and consequently degrade the sustainability of the fragile uplands. Faced with this situation, policymakers are very concerned about the prospects for successfully protecting or rehabilitating natural ecosystems, and maintaining the agricultural potential of the hillslope lands of the region.

Large-scale government reforestation projects have a history of over 50 years in many countries, but most have failed due to fire and lack of local support. Currently, there is much experimentation with contractual arrangements that subsidize private or NGO tree plantations. These efforts are based on the principle that a public subsidy is useful and necessary to induce the private sector to engage in the reforestation effort.

A New Path

This paper analyzes a different path: A situation where small farmers have independently begun farming timber trees on infertile grassland soils in the uplands, and doing so as a dominant enterprise using their own capital resources. We believe this development among pioneer farmers in Mindanao, Philippines, challenges prevailing assumptions, and opens up new possibilities for public sector support for this development. It may suggest a powerful prospective model in reforesting the uplands.

The study was conducted in two parts. The first examined the timber marketing system in northern Mindanao. Interviews were conducted with the saw mill companies in Cagayan de Oro, the major entrepot in north-central Mindanao. Timber and sawn lumber prices were gathered from major timber companies and from the regional office of the Department of Environment and Natural Resources. The second part was a set of open-ended interviews conducted with timber-tree farmers in several villages in the sloping uplands of Claveria, Misamis Oriental, a town located 25 km from Cagayan de Oro. The interviews and field visits documented the tree farm production systems and marketing practices and understand

the farmer decision-making processes. The sample of farmers was targeted to full-time farmers with relatively small land holdings.

Market-driven demand

The key factor responsible for the development of smallholder timber plantations was the recent emergence of attractive market-driven demand for fast-growing timber species. The historical price data that we were able to assemble is far from comprehensive, but was adequate to establish that timber prices have risen rapidly in the last decade. For the natural hardwoods, which are now disappearing from the remaining production forests, prices rose even faster. As an example, Between 1984 and 1993 the wholesale price of the lawa'an timber group increased from US\$0.19 to \$0.97 per board foot. Prices for medium-sized logs of falcata, i.e. *Paraserianthes falcateria* (*Albizia falcateria*) increased from \$24.00 per m³ to \$64.00 per m³, an average of 20-30% per year. Small diameter logs of *Gmelina arborea* fetch prices similar to falcata; medium-sized logs are priced closer to lawa'an timber.

Small-holder Agroforestation

Eleven smallholder timber farmers were interviewed. Their farm size ranged from 1.7 to 4.0 hectares. The primary enterprises prior to tree farming were annual food crops of maize, upland rice, and cassava. The area that they had planted to timber trees ranged from 0.5 to 3.0 hectares (17% to 100% of the farm). Ninety percent of the farmers had planted *Gmelina arborea*. Ten percent planted mahogany (*Swietenia spp.*) and *Acacia mangium*. The tree plantations were established as intercropped with annual crops of maize, upland rice or cassava.

Most plantations were planted in a 2 m by 2 m block spacing. The remainder were planted on contour lines on sloping land with a 1 m spacing between trees, and with food crops in the alleys of 6 to 8 m width. Annual intercropping usually continued for two years until canopy closure. In field with wide hedgerows it continued longer. Most of the tree planting of the farmers sampled has occurred within the past three years. Accelerated timber tree production on small farms was also observed in drive-through surveys of the other municipalities of Misamis Oriental and Bukidnon Provinces.

The sources of information about timber tree planting in our sample were family or friends, radio programs, and the regional office of the Department of Environment and Natural Resources (DENR). Seeds or seedlings were obtained from traders, neighbors, local mother trees, and DENR. All respondents indicated that the primary motive of engaging in tree production was the expectation of increased income, but 40% emphasized that they were seeking a replacement to annual crops because of declining yields. A similar number related the objective to have wood for building homes in the future, a market substitution response to high prices.

Harvesting and marketing follow one of two pathways: Contracting directly with the sawmill or a timber trader through a bulk contract wherein the contractor cuts and hauls the logs or rough-sawn timber to the mill, or direct delivery by the farmer of logs or the sawn lumber to the mill. The second path is usually relied upon only for small quantities.

Small-holder Advantages

Conventional wisdom surrounding forest plantations in the tropics has focussed on the argument of returns to scale; that is, large production units are necessary to minimize costs and justify the investment of management expertise. But returns to scale are often elusive, and may be outweighed by other considerations. Large-scale enterprises have not been competitive with small-holders in the production of some commodities. Major examples are rice and maize production.

In the production of fast-growing timber trees the returns to scale issue needs to be reassessed. We have identified three major competitive advantages of smallholder timber plantations vis-a-vis larger scale timber estates:

- 1) land preparation and weeding costs in the initial years are charged to the annual crops, minimizing tree establishment and maintenance expenses;
- 2) the cropped alleyways provide fire breaks that can drastically reduce wildfire damage; and
- 3) the more intensive management of the small farmer may better insure that the trees reach harvestable age.

The second issue, fire control, may be the most crucial advantage. Fire is a source of high (often extreme) production risk throughout the tropics, and particularly in areas dominated by imperata grasslands. Fire control on a plantation scale is expensive, and management intensive, but does not eliminate the threat. The greater intensity of land use that is characteristic of small-holders, lends itself much better to cheap fire control. This is enhanced by clean cultivation and more intensive site management in general.

Public Sector Support

What could the public sector do to support small-holder timber production? There is much scope to alleviate the regulatory environment to encourage smallholder timber plantations, to widely disseminate price information and extension knowledge on best management practices, to encourage the use of improved and diversified timber tree germplasm, and provide better infrastructure, and to stay out of the business itself. The research community should move rapidly to study future demand-supply scenarios to guide the development of the private timber industry and avoid massive price volatility, to develop improved seed and clonal materials of the major commercial species for rapid dissemination, and to develop and extend improved agroforestry production systems that involve hedgerow intercropping, shade-tolerant understory cropping systems, better rotations, and mixed timber species plantations.

In the recent past the timber resources of Southeast Asia were abundant and wood prices were comparatively modest compared to other commodities. That situation has changed dramatically in a relatively short time. The destruction of the natural forest has had one

positive spinoff. It has become profitable to grow trees as crop commodities. Evidence now exists that small full time farmers on the upland agricultural frontiers are moving into the production of timber trees as a major self-financed enterprise. The total number of participants is currently small, but it is encouraging to witness a market-driven option that has the potential to be a major force in environmental rehabilitation of the uplands. There is much to be done to help ensure that it will flourish in the future.

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Can there be synergism between small-scale farming and biodiversity conservation?

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Biodiversity in the tropics cannot be protected in natural parks only. Much of it exists in agricultural systems. ICRAF's work in southeast Asia has indicated certain directions through which work on agricultural systems can have major impact in biodiversity conservation. The key themes of the program are developing alternatives to unsustainable slash and burn agriculture and rehabilitating degraded lands. We are focusing on a number of thrusts that lead to strong basis for synergism between small-scale farming and biodiversity conservation.

In forest margins ecosystems ICRAF and collaborators are experimenting with new land tenure arrangements that include a component of natural resource stewardship (Indonesia and Philippines). We have found that the agroforests of Sumatra often contain a range of natural biodiversity similar to secondary forest. Our research effort on smallholder rubber agroforestry posits an approach to rubber development that retains biodiversity while increasing yields. In the grasslands we are testing social and technical innovations to enable smallholders to become the foresters of the future. On sloping farmlands, a new generation of minimalist conservation farming techniques based on natural vegetative strips has opened possibilities for a major spread of conservation technology.

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