



SECTION

Accessing markets



FOREST TO FINISHED FLOORING FROM THE FAMILY FARM

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Introduction

At Timbergreen Farm near Spring Green Wisconsin, USA, our family business engages in all aspects of future-oriented forest management: timber harvesting, wood manufacturing, and direct marketing of our annual harvest as finished flooring installed in our customers' homes. Installed and finished hardwood flooring is now selling for an average of US\$ 10,000 per 1,000 ft² (US\$ 10,000 per 100 m²). This earns us 1,000 times the commercial stumpage rate for small diameter trees, 100 times the stumpage rate for low-grade sawtimber, and 10 times the stumpage rate for our best trees.

The annual growth of our 200 acre (90 ha) forest is about 400 board feet of sawn timber per acre - 4 times the average for our region. In addition, Timbergreen Farm's harvests yield twice the usable products of a typical commercial logging operation. Our potential annual harvest could produce over 2 acres (1 ha) of installed flooring, earning us an income of over US\$ 4,000 per acre each year (US\$ 10,000 per ha), and we could support one full-time worker for every 40 acres (18 ha) of our forest, if we chose to fully utilize our annual growth. We have found that wood is the perfect fuel for small business.

My passion is to teach other forest owners that: a) their timber is very valuable; b) forests can produce a good annual income; c) there are simple alternatives to industrial practices; and d) forest owners can control their own small forestry business - if they choose to do so. The following ideas may be "seeds" to help change local methods and enhance profit to small businesses in the forestry sector.



“Full Vigor Forestry”

I describe Timbergreen Farm’s forest management program in my book, *“Full Vigor Forestry - Sustainable Forest Management from the Forest Owner’s Point of View.”* We work to encourage fully stocked stands of vigorous, high quality trees that produce an annual harvest. The best ideas from the Dauerwald system of natural forest management (Schabel and Palmer 1999), and the Native American Menominee Tribal Enterprise Forest here in Wisconsin have been used to maximize the many benefits our family gains from the forest. Another guiding principle in developing “Full Vigor Forestry” was to do just the opposite of what I learned was business as usual on private lands in the U.S. timber industry.

In “Full Vigor Forestry”, nearly every tree has high value and increasing species diversity is a key goal. Demand for wood products does not affect decisions relating to the harvesting of timber. We have learned to “watch nature” and harvest just the natural output of the forest. Timbergreen Farm’s most popular product is mixed-species character-grade flooring. Each installed floor is custom blended for the customer, but to be sustainable, we use only a mix of species and the specific pieces of wood. Natural succession and natural regeneration are encouraged. The gentle stirring of the forest through selective harvest encourages regeneration. This natural seeding is so effective that there is even a need to continually thin young trees to prevent over-crowding. The future composition of the forest is somewhat controlled by encouraging the growth of preferred small trees.

We view the forest as a living solar energy collector. A healthy, full-arrayed tree canopy catches available sunlight and converts the sun’s energy into wood. We see also each tree as a living solar energy collector. Hardwood trees are shaped like a funnel. Conifer trees have the cone-shaped funnel upside down, collecting the light on the sides of the crown. A tree with a large “funnel” crown exposed to the sun can grow quickly, whereas a slender tree with a smaller leaf surface will grow more slowly. Our goal is to have trees growing at a rate of ¼ inch to ½ inch (6 mm to 12 mm) in diameter each year. A crown width that is about one-third of the tree’s height is optimum for deciduous species. For conifers, a crown width to tree height ratio of one-to-four seems optimum.

Sunlight is the main requirement for tree growth, followed by water, and soil nutrients. We control the amount of these ingredients each tree gets by controlling tree spacing. We start with a tree spacing guide that is developed from the crown/height ratio. Spacing is then fine-tuned by observing individual tree-diameter growth. Maintaining vigorous diameter growth is a key goal of Full Vigor Forestry. A small annual harvest keeps the forest canopy intact and at maximum production. This produces much more timber than does a heavy harvest every decade or two.

Common sense forestry is understood and controlled by the forest owner

Forest management is simple, similar to growing a vegetable garden or an agricultural crop. Thinning and weeding are common-sense principles most people can relate to. The basics of forest management can be taught in one day. Trees are primarily affected by the other trees surrounding them. We manage a small group of trees by thinning and weeding, move on to another group, soon leading to the effective management of the whole forest. Tree-diameter growth determines the amount of thinning that is needed. We have demonstrated that all species, including our dominant oaks (*Quercus rubra* & *Quercus alba*), respond to release and can be selectively harvested.

When choosing to harvest timber, the Full Vigor Forestry motto for the last 20 years has been simply: “Take the worst first”. My German teachers have a similar phrase: “Harvest the lesser tree”. Every tree has many values: aesthetic, wildlife habitat, stand diversity, resource protection, regeneration potential, wood products, etc. When comparing two trees that are competing, a forest manager assigns value to each tree, taking into account all the different contributions of each. The lesser-value tree is then harvested, allowing the best trees to grow and regenerate for the future.

Timbergreen Farm’s annual harvest potential is roughly about 400 board feet of sawn timber-sized trees plus another 100 board feet from small-diameter trees per acre. This is the volume of one oak tree, 24 inches (60 cm) in diameter and 80 ft (24 m) tall. The farm could produce 500 ft² of flooring per acre each year (100 m² per ha). Normally, we would take several smaller trees of a variety of sizes per acre, always taking inferior trees first. A forest growing under full “Full Vigor Forestry” principles will produce logs of all sizes, from 6 inches (15 cm) diameter inside the bark, to 36 inches (1 m) diameter or larger. We have no maximum size or age for a good tree, they are allowed to grow as long as they maintain their vigor.

In the process of restoring a typically high-grade forest to “Full Vigor”, most of the harvesting will be of low-value species and small-diameter, damaged, and deformed logs that loggers have rejected in the past. Often, 80% of the harvest will be logs of less than the 12 inches (30 cm) diameter. Small logs are relatively easy to handle and small machines are available for each step. We have developed our skills in sawing these small logs into lumber and producing high-value mixed-species character-grade flooring. Small-diameter logs have small knots and produce an interesting character that is very attractive to niche-market consumers. There is high lumber over-run when sawmilling and very little waste when making flooring. We can earn nearly as much from commercially worthless salvaged logs as from our good timber. All trees earn us about US\$ 10,000 per 1,000 board feet or 1,000 ft² of flooring (US\$ 10,750 per 100 m²).

We have built an extensive eight mile (13 km) road and trail system through the forest that allows us to carefully harvest any tree on the property any year. No good tree is wasted if it dies or blows down. The trail system makes the whole property more enjoyable for the many people who hunt, trail ride, hike, train, and work here.

Felling and arthroscopic logging

Timbergreen Farms selectively harvests up to one tree per acre each year using “arthroscopic logging” techniques. When the land is family-owned and the forest directly provides family income, damage to the resource cannot be tolerated. Directional felling methods taught by Soren Erickson from Sweden are used. Safety for the feller, accuracy and control of felling, and minimizing damage to the butt log all are important elements.

There is an incentive to maximize the use of harvested trees. Stumps are cut as low as possible, partially rotten and hollow logs, crooked and bent logs, dead logs (often oak logs that have been dead for 5 years are still sound, and spalted maple is actually more valuable than white wood), and small diameter logs are also processed. Crotches and sound burls are sawn and dried for highest value use.

Trees are pulled to the trails using a fetching arch and a radio-controlled winch mounted on the farm’s 55-horse power 2WD farm tractor. We constantly revive “old technology” while adding modern aspects. The average skid to a trail is less than 100 ft (30 m). A prehauler picks up the logs piled along the trail and carries the logs out of the forest, directly to the sawmill. The average distance from stump to sawmill is ½ mile (1 km). To avoid damage to residual

trees and regeneration, we never drive a machine off the trail network. Also, machines are never driven on the trail if the ground is soft.

On-site manufacturing

The annual harvest from Timbergreen Forest is processed into finished products on-site. An electric WoodMizer LT40 sawmill, a band resaw, and a circular two-saw edger are all housed under one roof. Methods for efficiently milling the high percentage of curved logs and small-diameter logs have been perfected. Straight oak logs are usually quartersawn to get an attractive and stable grain pattern. Timbergreen Farm's goal is to transform each piece of wood into its highest value use.

Sawn lumber is immediately stacked on stickers in one of the pre-drying chambers of our solar cycle kiln buildings. The ends of the boards are protected from over-drying, rain and sun is kept off the wood, and the high roof overhead accelerates the natural air flow to pre-dry the lumber from 90% to 12% moisture content in 3 months.

Once the lumber is fully pre-dried, solar energy is used to heat the air in the kiln chamber to dry the wood to 6% moisture content in one more month. The farm's three solar cycle kilns collect 1.5 million BTUs of free heat on a sunny day, and can operate at 80°F (45°C) over the outside temperature. Only a small amount of electricity is needed to circulate the hot air in the kiln chamber. The daily heating cycle naturally equalizes the moisture content of the lumber each night so steam conditioning is not needed at the end of the drying period. This produces superior-quality lumber and makes the kiln very inexpensive and simple to build and operate. A solar cycle kiln has four main parts: a clear insulated window; a black metal collector surface to heat the air; fans to circulate the hot air; and an insulated wood chamber. Many local building materials can be used to build these kilns: wood; greenhouse materials, concrete blocks, and straw bales. The unique design for the solar cycle kiln developed by Timbergreen Farm is now being used in many countries around the world.

The farm's century old, 100 ft (30 m) long dairy barn has been remodeled to accommodate the business. Upstairs in the hay loft is an insulated and humidity-controlled lumber storage room. Wood is stored at 6% moisture content so that it can be used immediately. Some excess kiln dried lumber is sold to area woodworkers, but the priority is to sell most of the wood as higher value manufactured products.

Downstairs is a workshop where a variety of wood products are manufactured. Basic woodworking tools and a Swedish-made Logosol 4 head molder are used to make high-value merchandise. Flooring is the central source of income, but custom-made glued-up wooden countertops, stairways, millwork, furniture and gifts add to our sales. When making flooring we can use pieces of wood as small as 1 inch x 3 inch x 12 inch (25 mm x 75 mm x 300 mm). When making wooden pens and glued-up cutting boards, even smaller pieces can be used. Scraps are used for fuel. Every aspect of wood manufacturing is controlled, keeping it as simple as possible. Carefully selected tools allow the farm to "turn straw into gold".

We eliminate brokers and middlemen - selling directly to customers

The key to Timbergreen Farm's success is direct marketing to customers. The retail sale produces the highest profit of any of the steps and more than justifies all of the hard work of manufacturing wood products. The retail profit is about US\$ 2,000 per 1,000 ft² (92 m²) of flooring. This is also the easiest and safest step of the entire process.

Every floor that we install becomes another showroom for us and the happy customer becomes voluntary sales staff. Our customers sell the next floor for us! New business is attracted with almost no cost for advertising or retailing. The farm receives a lot of attention in the media, generating additional new business with no advertising costs involved.

Nearly everyone uses wood products everyday. We see every house as a potential project and every person as a potential customer. People prefer to buy from a local producer as compared to the big building supply stores.

One third of the retail cost of wood products in the U.S. is attributable to transportation costs. This is about US\$ 3,000 per 1,000 ft² (100 m²) for flooring. Timbergreen Farm is able to minimize hauling costs and capture this additional revenue. Generally, the wood is trucked once, from the workshop to the customer's home, usually during the daily commute to work. Most of the flooring installation jobs are within an hour's drive of the farm. (50 miles or 80 km) Installation is the most fun and profitable step.

We learned how simple it is to install flooring when we built our own log home eight years ago, and we have been selling installed flooring ever since. When a molding machine was purchased four years ago and the entire process from forest to finished flooring was controlled, our costs went down considerably, our profits went way up, and our enjoyment of the business skyrocketed too.

It is easy to sell the farm's flooring and other wood products directly to customers. We have advantages in this approach over a wholesale market where you are competing with big industry. We guarantee our work and wood, and since we are the producer, the consumer's confidence is high that we will do what we say.

Value-multiplied manufacturing at Timbergreen farm

How we earn US\$ 10,000 per 1,000 ft² (US\$ 10,750 per 100 m²) of flooring:

Activity	Time spent	Value added
Harvesting	2-5 hours	US\$ 250 per mbf ¹
Sawmilling	3-5 hours	US\$ 250 per mbf
Kiln Drying	4 hours	US\$ 250 per mbf
Tongue and Groove Flooring	10 hours	US\$ 1,500 per mbf
Floor installation	80 hours	US\$ 7,000 per mbf

¹ mbf refers to 1,000 board feet

Other benefits from the forest

My father, my partner, and I each work part time in this business, though our forest's growth would support six full-time workers. Our family gains benefits from the forest in addition to timber income. We operate a native wildflower nursery to help other forest owners reintroduce natural plants that have been destroyed by overgrazing. We produce shiitake mushrooms on small-diameter logs coming from logging residues and timber stand improvement thinning. Wild mushrooms are collected from the forest. We lease most of our land for wildlife hunting, earning almost enough to pay the property taxes. We also harvest deer meat for our own consumption. The extensive trail system makes all areas of the property accessible for recreational use by family and friends.

We burn fuelwood to heat two homes and provide firewood to our neighbors. We are currently trying to find a practical method of turning our waste sawdust, planer shavings, slabwood, and harvest scraps into usable and exportable energy. Possible products being considered:

- wood to power a steam engine or steam turbine with a generator to make electricity
- wood gasification to power an internal combustion engine with a generator to make electricity
- bio-digestion of sawdust and chips, followed by distillation of ethanol - within the industry, the leading idea today.

Business summary

- We own our wood until it is installed in the buyer's home.
- We focus on making high-value products, not producing large volumes of wood.
- We market timber according to the natural output of our forest, not industry "demand".
- Our priority is to market locally, but our website lets us sell to the world.
- As forest owners, we are in full control of our forestry business.
- The market is vast for direct sales to customers; most buyers prefer it.

Why I developed "Full Vigor Forestry"

Being the first consulting forester to ever advocate for the small woodlot owners in the region, I was overwhelmed by thousands of sad stories of how timber owners had been "ripped off" by timber buyers. I found a timber market with no competition, no information, and no significant government marketing assistance available to forest owners.

As a forester and forest owner, over the years I participated in government forestry programs and worked within the conventional timber industry. What I learned in college about formal inventories and complicated harvest plans for long-interval harvests just did not work on small woodlots. Every effort failed to produce responsible and profitable forest management on small private forests. Only a small percentage of woodlot owners in the U.S. even try to manage private forests today.

Eight years ago a third generation German forester visited me. After driving 40 miles (65 km) from the airport to Spring Green, Dr. Ingo Grebe noted, "I see that you don't manage your timber here." (Two years ago I visited Germany and instantly understood the difference

between German industrial forestry and U.S. high-grade forestry). Americans don't value their forests as Europeans do. It could be said that U.S. forest owners have low "forest-esteem". The reasons became clear talking with local forest owners: the prevailing timber market is a horrible deterrent to practicing forestry on private lands.

Why forest owners don't manage - the underlying reasons

Timber prices are too low to make forest management profitable. The U.S. timber industry is a US\$ 300 billion per year giant. Everyone in the industry makes good profits, except for the forest owner. Forestry will never be sustainable if the producer is not being adequately rewarded for his or her efforts and investment. Timber prices at mill yards are controlled by supply and demand, and are so low that timber buyers are pressured to minimize what they pay the forest owner just to stay in business.

In rural America, the daily market prices for many agricultural crops are broadly announced, but there is no regular or standardized market information system. Every timber sale is the result of a negotiated price between an experienced buyer and an inexperienced landowner. Every attempt to provide meaningful price information to forest owners has failed and reported prices are too low to be profitable. Variations in grading and scaling standards make it difficult for the forest owner to interpret what price information is available and appropriate.

Logging equipment is becoming larger and more expensive. Heavy harvests are therefore needed to make a profit for the logger, and the expensive machines often must be operated even in bad weather to make the payments. The timber industry accepts damage on private land as normal and necessary to feed the mills with a steady supply of wood.

Theft and fraud are common and usually ignored or covered up. Investing in forests appears excessively risky when the likelihood of theft is great.

Most forest owners in north central U.S.A. do not respect or eagerly deal with foresters. The profession has failed to bring about significant sound forest management in much of the United States. The average forest owner ignores their timber, and then deals directly with a timber buyer when enough mature trees are present for a harvest - where just the good trees are taken.

Professional foresters typically tell forest owners that they are not qualified to manage timber. The message is often conveyed as, "Only a professional can write a management plan or mark timber." Technical language and industrial practices overwhelm most individual landowners.

Foresters cannot act as brokers for landowners while simultaneously serving as "procurement officers" for industrial mills without facing serious conflicts of interest. Feeding the big mill with cheap timber becomes their overriding priority. Consulting foresters who "work for landowners" in reality are often more loyal to the big mill, not the forest owner - as the forester's income is tied to future sales to the mill and a simple forest owner is expendable. Foresters have compromised due to the steady pressure from the big mills to work in ways that increase industry profitability.

There have been limited alternatives to the traditional timber market system which is dominated by large corporations. A few forest owners have learned to make the best of a bad situation, but the market generally discourages sound forest management on small private forest ownerships.

A new marketing alternative

At Timbergreen Farm, we have developed a new and separate timber market that encourages and rewards sound forest management on small forest holdings. One common question is whether the market exists for other forest owners to adopt our successful model. We have never been afraid of competition from other forest owners, or worried that we would saturate the market with our good wood, driving down the price. The opposite is true – forest owners need strength in numbers to control the timber market for their advantage, not the benefit of the big corporations.

Forest owners must realize that when their timber is harvested, the finished products can be sold in the retail market directly to customers. A choice exists between selling their trees to a timber buyer and letting the industry make 99% of the money, or controlling the marketing of their wood. Most indications are that customers would prefer to buy directly from local producers that they know, rather than some faceless retail outlet in the city.

Cooperative business ventures

To enhance forest management it is proposed to initiate community-based, value-multiplied cooperative businesses. Our goal was to control the marketing of our own timber, capture middlemen's profit, and pay professional loggers and forest owners fairly.

So far in the U.S., efforts to establish “Sustainable Woods Cooperatives” have been blocked. The few sustainable forestry cooperatives that still exist in the Midwest of America have largely been steered by the professional foresters interested in instructing what forest owners are “supposed to do”; holding educational field days featuring “expert” foresters, attending inspirational walks in the woods, and holding meetings to talk about group marketing of trees into the traditional timber market.

Another great idea is co-opted

Timbergreen Farm was the first Forest Stewardship Council (FSC) certified private woodlot in the Midwestern U.S. and Timbergreen Forestry was the first FSC-certified resource manager in the region. Upon receiving certification, we were immediately flooded with calls from all over the world that wanted to buy shipping container-load quantities of “top-quality” FSC-certified wood at “rock-bottom” prices. Based on this experience, we found that FSC certification was too complex, expensive and ineffective, and that it actually discouraged good forest management on private woodlots.

At Timbergreen Farm, we now simply tell our own story in our local community. We show customers how we work with wood and help them become discriminating consumers. We find that this is much more effective for our business than paying for a global eco-label.

Wood - the perfect FUEL for small business

The following are my recommendations for forest owners and loggers to responsibly manage the forest in a profitable and sustainable manner.

Organize a business to meet the needs of the family and community. Create new and separate markets for high-value wood products through direct sales. If no direct marketing opportunities exist in the area, products can be shipped to metropolitan areas. A producer-owned factory outlet store may be one option. Finished products have been traded for thousands of years. Today it is much easier than ever via electronic communications technology. Always sell the local story of the wood to the customer.

A growing number of successful small businesses have been developed following our forest-to-finished-flooring concept. “Timber Techniques Training” is our week-long program at Timbergreen Farm where individuals or groups can see it all for themselves and receive hands-on training to learn the system.

Key characteristics of this new market include:

- Operation of a profitable business that pays good wages for hard work.
- An annual harvest that creates steady income.
- Common sense forest management is understood and controlled by the forest owner.
- Harvesting levels are based on the natural output of the forest, not pressured by industry demand.
- Skilled, well-paid professional loggers who return year after year to harvest timber.
- Minimization of wood hauling to control expenses.
- Use of the simplest possible methods and machines.
- “Turning straw into gold” on your own property.
- Focus on making high-value products, not producing big-volume commodities.
- Elimination of brokers and middlemen - sell directly to customers.
- More good jobs being created for local people.
- New direct marketing opportunities through internet sales.
- Building on existing trade routes that can be modified for local benefits.
- The forest owner maintains ownership of the wood until installation.

Although priority lies with marketing locally, a website enables you to sell to the world since today, wood can be shipped anywhere, anytime. In a global economy, virtually no one is isolated anymore. The only limitation to the enterprise is lack of imagination.

References

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OLD-WORLD CRAFT PROMOTES THIRD- WORLD DEVELOPMENT: COMMUNITY FORESTRY MEETS APPROPRIATE TECHNOLOGY

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Introduction

One of the first things the Conquistadors shed when they reached the shores of tropical America was their armor. As effective as a tailored suit of Toledo steel may have been against the spears and arrows of the native Aztec and Maya populations, armor was unbearably hot, heavy and hard to maintain in the steamy forests of the New World.

Modern woodworking machinery suits the tropics just about as well. In an environment that receives a foot or more of rainfall during each month of the rainy season, rust blooms on steel almost before your eyes. Saw blades are quickly dulled by dense, resinous hardwoods, and power supplies in many developing countries are erratic, at best. Kiln-dried wood is, in much of Latin America, a lot harder to find than bottled water. And wood's hygroscopic nature causes even dried lumber to reabsorb moisture as it seeks equilibrium with its surroundings.

GreenWood is an innovative training program launched in Honduras in 1993 that applies “old world” technology in the developing world, teaching artisans to build furniture with split and shaved green (wet) wood, worked mainly with hand tools or foot-powered pole lathes. The green-wood revival that has taken place over the last quarter century in North America and Europe may be helping post-industrial enthusiasts reap the intangible rewards of hand craftsmanship, but there is nothing romantic or nostalgic about the introduction of low-tech woodworking in the developing world.

GreenWood’s goals are straightforward and practical, to:

- Promote good forest management by exploring uses and developing markets for a wide range of lesser-known tree species, log residues and non-timber forest products; and,
- Provide rewarding, skilled employment as an alternative to shifting agriculture, cattle ranching, urban migration, and the environmental depredation that results from these practices.

The approach GreenWood employs to achieve these goals is “appropriate technology,” that matches the tools and methods employed in transforming wood products from the full spectrum of available resources in a host community - natural, material and human. These resources include: trees and plants and related forest resources (*natural resources*); access to tools and machinery, hardware and glues, electricity, investment capital, and markets (*material resources*); and the training, experience and craft heritage to be found among local artisans (*human resources*).

Over the last 25 years there has been a significant shift in forest ownership around the world. Indigenous and community land claims have gained recognition at the same time that economic development and environmental interests have begun to converge, causing the ownership and control of global forest lands to be devolved from the state to local communities and indigenous people. In the major forested countries of Latin America, community-owned forests now represent a substantial portion of the total forest area: 13% in Brazil; 36.6% in Bolivia; 34.2% in Peru; and 80% in Mexico. A recent study of forest ownership calculates that the aggregate forest land now subject to community or indigenous control exceeds 168 million hectares in these four countries alone. The study also estimates that “some 60 million highly forest-dependent indigenous people live in the rain forests of Latin America, West Africa and Southeast Asia. An additional 400 million to 500 million people are estimated to be directly dependent on forest resources for their livelihoods.” (White and Martin 2002)

This global rise in community forest ownership marks a historic opportunity for the future of the tropical forest estate and alleviating endemic poverty in the developing world. The people who live closest to the forest have the greatest stake in its preservation. But forest policies and the marketplace for forest products have traditionally favored large producers over small, a tendency exacerbated by the assistance provided by many donors. These political and financial hurdles are compounded for community forest producers by a host of obstacles that inhibit or preclude their successful entry into the marketplace. These include:

- logistical challenges (e.g., poor infrastructure and communications, distance to market, and the like);
- language barriers and a lack of basic business skills and production experience;
- a scarcity of honest brokers, practical market information and transparency; and
- limited access to technical expertise and the capital required for its implementation.

GreenWood aims to address all of these fundamental barriers, but this paper focuses primarily on the last factor - appropriate technology - as a keystone of development. In the process it

also challenges one of the most widely held misconceptions underlying conventional economic development: (i.e., that access to the latest technology is the fast track to progress). A separate case study of export guitar-part production, explains how GreenWood's role as an honest broker helps to mitigate some of the other business and organizational weaknesses that plague forest communities. (see Box 1)

Box 1: Transparency fosters community investment

GreenWood is commonly referred to in Honduras as the “chair project,” but over the years we have trained artisans and sawyers in the manufacture of many other niche forest products. These include ship's knees, lapstrake river boats, wooden pens, bowls, rustic fencing and guitar parts. By just about every quantifiable measure - volume of timber harvested, forest area under management, and 4”X4” income to local residents - GreenWood's most successful export venture is the ongoing production of 4”x4” mahogany guitar parts for the Taylor Guitar Company of California. Collaborating on the manufacture of more than 21,000 board feet of export-quality, kiln-dried mahogany, GreenWood has worked closely with the community of Copén on pre-harvest planning, tree felling and log conversion, transportation by mule and river, sawmilling, kiln drying and shipping.

Underpinning this functional support are GreenWood's transparent business practices and the unprecedented community investment it has engendered. Following the successful export in 2005 of our first container of guitar parts, GreenWood met with members of the Copén sawyer's collective - a community group of 25 timber producers who hold harvest rights to more than 4,000 hectares of primary forest adjacent to the Río Plátano Biosphere Reserve.

At that meeting, two fundamental terms for the ongoing relationship were agreed: First, GreenWood would undertake an active role in helping the group's treasurer and president to manage their accounts, keeping track of all income and expenses. (This was a direct response to the sawyers' consternation when we demonstrated how much money they had earned from the previous year's harvest and sale of guitar parts; members of the group were uniformly convinced that they had lost money the year before!) Secondly, having negotiated the highest price ever paid for this product in the local marketplace, GreenWood offered to share all of the production costs and divide the proceeds from the sale equally with the community producers. This gave the Copeños a stake in the success of the venture, and revealed the complex steps of export production, including the full costs involved. Looking ahead, Greenwood also hoped to motivate the Copeños to assume greater management responsibility for components of the venture.

To ensure the orderly disbursement of funds to the collective, GreenWood's bookkeeper verified the group's previous expenditures before authorizing each advance. Following the collective's delivery of the first load of sawn lumber, GreenWood's bookkeeper and field forester analyzed the costs and benefits of every step of the community's involvement. Initial results indicate a net income of approximately US\$ 1,250 per person for each of the 25 members of the sawyer's group. This income, earned during roughly two months of active timber harvest, production and transport, represents about 95% of the average per capita annual cash wage in the community.

Most rewarding, the Copén sawyers committed themselves to investing US\$ 105 per member, or more than US\$ 2,600 for the entire group - plus an equal amount from the collective's coffers - in another production of guitar wood. In other words, they're

investing roughly US\$ 5,500 without any further advance from GreenWood or the client. This investment confirms that: a) the group has earned enough money to invest in future activities; b) they see real promise in the venture; and c) they are prepared to assume greater responsibility and risk in return for greater potential profits and control. All this adds up to a major milestone on the road to financial stability and sustainable development.

Source: Scott Landis

Appropriate technology in action

GreenWood was inspired by an attempt to jumpstart a stalled furniture industry in the Yucatan Peninsula of Mexico during the early 1990s. Canadian designer Michael Fortune encountered a craftsman's nightmare of decrepit sawmills, workshop machinery in disrepair and a litany of problems common to working wet wood and irregular, small-diameter logs. "Inaccurate joinery accounts for a high failure rate," Fortune wrote, "and glue is not effective when wood exceeds 11% moisture content." The disparity in moisture content between the tropics (16% in southern Mexico) and North America (7% in most of the U.S.) presented a further obstacle to a prospective export trade in furniture. (Fortune 1990)

Pondering this lament, Tennessee chair maker Curtis Buchanan thought Fortune might be barking up the wrong tree. "Why not try green woodworking?" Buchanan wondered. The oak spindles and bent bow of his Windsor chair backs and the turned maple undercarriage are made entirely of wet wood. The parts are split directly from the log with an ax and froe, shaved with a drawknife and selectively dried in his shop using a small, homemade kiln. The technology is ancient, but at prices now approaching US\$ 1,000, Buchanan's bottom-of-the-line, bow-back Windsors are hardly rustic. Green-wood technology, he reasoned, might be ideally suited to the tropics, and it doesn't require a shop full of expensive machinery to get started.

Buchanan joined Kentucky chair maker Brian Boggs in 1993 on GreenWood's first expedition to Honduras, where traditional hand-tool technology appeared well suited to the full range of local resources. Specifically, the pair encountered a large variety of lesser-known tree species that might be incorporated in green-wood furniture production. Few of these species were being harvested or processed, and little was known about their working properties. There were no developed forest management plans for these woods and few established markets. They also noted a lack of local capacity for secondary processing (sawmills) and drying (kilns), which are essential to the production of quality woodworking by conventional, machine-tool methods. Many forest communities in tropical America have no access to electricity and minimal experience in the use of machinery. There is little or no money available to invest in costly generators, fuel or other conventional woodworking equipment.

Buchanan and Boggs hoped to uncover local chair-making designs that they might improve upon or adapt with green-wood technology. But the furniture they found on the North Coast of Honduras was uniformly crude and uncomfortable, or imported from neighboring countries; in isolated forest communities, it was virtually nonexistent. In any event, they judged that regional furniture styles held little promise for local tourist or international markets.

The chair makers decided to import a traditional North American design, incorporating a woven vine or bark seat for local character and to utilize available non-timber forest products. Thus, GreenWood's initial training and marketing initiatives were based on ancient hand-tool

technologies exemplified in the Appalachian-style seating furniture of Kentucky and Tennessee (Post-and-rung ladderback and Windsor chairs are, in turn, derived from earlier European traditions). Although green-wood furniture is highly functional and visually straightforward, successful joinery actually relies on a highly sophisticated understanding of wood properties - specifically, the swelling and shrinking of adjacent parts to create strong interlocking joints. The integrity of green-wood chair construction depends on the traditional mortise-and-tenon joint, in which a super-dry rung (the tenon) is installed in a bored hole (the mortise) in a relatively wet leg. The leg shrinks and the rung swells in cross section as the parts reach equilibrium, creating a strong interlocking joint without the use of glue or mechanical fasteners. Furniture thus constructed can last indefinitely if well maintained.

In terms of efficiency and economy, green woodworking is hard to beat. It is much easier to split and shave green wood than it is to saw and plane dry lumber, and the means of transforming the raw material can be easily and cheaply introduced in forest-based communities. For less than US\$ 100, an individual artisan can purchase a complete kit of hand tools, with which he or she can produce salable furniture. Whereas conventional machine-tool technology tends to encourage debt and the centralization of manufacturing, what might be called the “*maquiladora*” model,¹ simple hand-tool technology encourages independence and flexibility. No electricity is required and minimal additional investment is needed for the establishment of productive workshops.

There are several other assets of this style of furniture making. Its portability enables artisans to conduct at least some of their primary processing in the forest, thus reducing the need to transport heavy logs and returning an abundance of decomposing, wood-residue nutrients to the forest. The relative safety of hand-tool technology reduces the likelihood of serious accidents and debilitating injuries in societies that provide little or no safety net for injured workers; the safer technology also encourages active participation by women, girls and boys of all ages and technical ability. This flexibility is further enhanced by the ease with which green woodworking is adapted to small-scale or cottage-industry production units. Simply put, this craft method suits home workshops and a broad range of family participation.

Whereas conventional machinery typically leads to a reliance on a few heavily exploited commercial species - e.g., bigleaf mahogany (*Swietenia macrophylla*) and Spanish cedar (*Cedrela odorata*) are the timbers of choice on the North Coast of Honduras - green-wood technology lends itself to experimentation with smaller trees and lesser-known species. Moreover, the unique nature of green-wood design and production distinguishes GreenWood products from those of other conventional woodworking manufacturers, and helps to establish an identity for our products in the marketplace. The quality, cost and marketability of the finished product reflect an artisan’s design and construction skills (labor) more strongly than his or her investment in materials or expensive tooling (infrastructure). In combination, these factors result in potentially greater profit margins for rural artisans and a more sustainable long-term relationship with their source of materials.

The early workshops

Invited to Honduras by the Broadleaf Forest Development Project (PDBL), a joint forestry initiative between the government of Canada (CIDA) and the Honduran forestry agency (AFE-COHDEFOR), GreenWood chose to begin work in an indigenous Pech community not far from the North Coast. Resisting the temptation to launch a portfolio of ready-made designs,

¹ *maquiladora*: cross-border assembly plants, originally based in Mexico.

Buchanan and Boggs concentrated on the most basic of all seating furniture: the homely stool. Stools involve the essential technology that artisans eventually employ to build chairs, but their compact form ensures speedy gratification and fosters experimentation with a wide range of materials. This measured approach also encourages students to participate in the design process and take ownership of the project.

Once the location for the first training session and a basic curriculum were established, Mr. Buchanan arrived to teach his first class. Assuming that his students were out gathering wood when the first session was scheduled to begin, he set up a shaving horse in a school workshop and began splitting wood to make a few rungs. Surrounded by a scrum of curious youngsters, Mr. Buchanan sat down at the horse (called a burro in Spanish), picked up a drawknife and demonstrated the process of shaving rough stock to round - the foundation skill upon which all green-wood chair making is built. With swift, rhythmic strokes of the knife, he deftly transformed the stock, first to a square, then an octagon, and ultimately a round, softly faceted and gently tapered rung. After a few minutes, the travel, the heat and the diet began to take their toll, and Mr. Buchanan retired to a second floor dormitory. Throughout that first afternoon, sounds of the boys chirping in barely comprehensible Spanish and slicing away with the drawknife filtered upstairs from the shop.

Like many professional North American craftsmen, Mr. Buchanan teaches adult workshops, so he was initially shocked and crestfallen to discover that the seven 14-year-old boys he had met downstairs were his students. However, it wasn't long before they proved their mettle. In rural forest communities throughout Latin America, there is a brief window of opportunity during which adolescent boys begin to acquire the muscle and dexterity of an adult, but before they are encumbered with the full responsibilities of a family. They typically live with their parents and are obliged to tend crops. Until they marry, these youngsters enjoy a relative respite from the full rigors of subsistence living.

At GreenWood's first training site - Santa María del Carbón, Olancho - workshop participants included all the male students and teachers of the local training school, where GreenWood technology and elements of design were rapidly incorporated into the curriculum. In other communities, eligibility is typically voluntary and open to all interested community members, regardless of age, gender and experience. However, in practice, the majority of participants are usually drawn from the membership of the most active collaborating organizations in the community. Increasingly, new participants gain experience through an informal apprenticeship with more experienced GreenWood artisans.

Brian Boggs traveled to Honduras a few months later to find four *burros* in action and a newly finished barstool awaiting his review. He spent much of the second training session working on tool sharpening, an ongoing challenge, and trying to convey the "concept of square." Noting the local emphasis on functional utility and the scarcity of embellishment among the thatched-roof mud huts and other handmade articles in the village, it occurred to Boggs that his obsession with quality might be out of step with a culture still preoccupied with its own precarious survival. However, it was gratifying to observe the native facility for tool use among our Honduran students, whose early introduction to the machete fosters a familiarity with the use of sharp edge tools that has, by and large, been lost on North American youngsters.

Mr. Boggs employed a method favored by the local schoolteacher to teach sharpening. First, he explained and demonstrated the process. Then, one student copied Mr. Boggs's example while explaining the techniques to the class. Finally, he sharpened the tool again with the same student providing instruction. It was slow and repetitive, but effective. In no time the whole class was sharpening drawknives to a respectable working edge. During another workshop, Mr. Buchanan noted that at least one of his students was sharpening his spokeshave blade to a razor's edge, "better than 99% of the woodworkers I know back home." Students began signing

their furniture almost immediately, taking personal responsibility and a maker's pride in their work.

Mr. Boggs used the rest of his trip to investigate new tree species and fine-tune production. He and the students felled a 12-inch-diameter (30 cm) cola de pava (*Cespedezia macrophylla*) tree that was straight and clear for about 50 ft (15 m) and found that the wood split beautifully. Cola de pava is a lesser-known hardwood species, with roughly the same, moderate density as American cherry. It regenerates easily from cut stumps, but until our arrival the wood had no local or commercial applications. Boggs also harvested bark from a slim log of capulin negro (*Trema nithranta*), a very common but similarly underutilized tree species throughout the North Coast. GreenWood has since tested and used numerous other woods and barks, but cola de pava and capulin remain at the top of the list of preferred materials for structural members and woven seats in our furniture.

The forest connection

It wasn't long before GreenWood realized that the forestry project that had drawn us to Honduras was providing virtually no assurance that the woods used by our artisans were actually derived from well-managed forests. Among other things, the management focus was limited to primary forests, and there were no plans developed for noncommercial tree species. In fact, the management of secondary forests attracts little interest among the forestry establishment of Honduras (or in many other developing countries). This is largely a result of the common perception that secondary forests represent underutilized agricultural lands, which ought instead to be intensively cultivated for their short-term return on investment.

To address this deficiency, GreenWood launched its secondary-forest management program in 1999. The initiative was the first organized attempt in Honduras to provide a sustainable, quantifiable supply of pioneer timber species (and non-timber products) from secondary forests - known locally as *guamiles* - which provide the primary source of materials used in the construction of furniture made by GreenWood artisans.

Under the supervision of GreenWood foresters, *guamil* owners met with artisans, the tribal council and other local stakeholders to design and implement management plans for their *guamiles*. Two objectives emerged in the process of elaborating an agreement governing their use and harvest. The first goal was to achieve a sustainable supply for artisan production through the implementation of a management plan for lesser-known species and non-timber forest products. The second was to establish reliable mechanisms for ensuring that a meaningful share of the benefits generated by the harvest and sale of these resources would accrue to the community as a whole, and not merely to isolated groups or individuals.

In order to realize the second objective, GreenWood developed a multi-stakeholder agreement that established the following roles and responsibilities:

- *Guamileros* direct the forest management plan.
- GreenWood artisans purchase wood, bark and other products from *guamileros*.
- The tribal council administers the financial exchange.
- Other local authorities, including the communal assembly, ensure that the tribal council invests financial proceeds from this system in direct services for the community, such as materials for the school, the health center and other projects.

From a silvicultural perspective, GreenWood's *guamil* management approach is considered a mono-cyclical system with a 25-year rotation, after which a parcel could be cleared and another lengthy fallow period would ensue. This system is attractive to *guamileros* because their income from agricultural production can be augmented by the sale of wood products. For GreenWood and its artisans, the *guamil* system represents a means of establishing practical links between sustainable forest management, the production of high-quality furniture using simple technology and the sale of innovative products for niche markets. For the forestry authority of Honduras, GreenWood's *guamil* management plan constitutes the country's first systematic organization of a timber harvest in secondary forests, in a manner that will facilitate its replication in other communities.

The marketing conundrum

Ironically, the connection between furniture and well-managed forests relies on a transaction that is foreign to many NGOs, ecologists and donor organizations: sales. No amount of appropriate technology or responsible forestry can be maintained for long without the sales and marketing that comprise the third, indispensable leg of the GreenWood program. As one of GreenWood's clients likes to say, "Nothing happens until somebody sells something."

In a country like Honduras, where village carpenters grind the carbon rods from spent D-cell batteries and mix them with kerosene to ink their chalk lines, everything has a value. Even as GreenWood instructors began to think about how to break into the marketplace, our artisans were selling chairs. Artisans typically begin by making furniture for their own homes and quickly move on to serve the needs of their extended family, friends and neighbors. With little or no coaching, local sales continued to grow. The more serious and aggressive artisans cultivate their own clients, and GreenWood helps develop broader market opportunities through sales to restaurants, bars and hotels in the developing tourist sector.

The international market is usually the first, and too often, the only outlet contemplated when consultants from the North design marketing programs for the South. The underlying assumption is that only the higher dollars and volumes generated by export sales are worth the investment of time and money. If anything, this perception has only been reinforced by the introduction of certified wood products, which have begun to attract interest in North America and Europe but have generated no discernable market in Latin America. It's hard to ignore the allure of the U.S. dollar and the vast retail market in the developed world, but successful, long-term relationships between community forest producers and export clients are rare.

The reasons for this fact are not hard to find. In the first place, the full cost of export is rarely factored into the business model and is often difficult for community producers to grasp. Few communities are equipped to identify, much less perform, the brokerage functions required to complete a successful export transaction. These include complex documentation, shipping protocols and extensive client communications, usually conducted in English. So the communities remain at the mercy of costly and sometimes dishonest brokers or inexperienced NGOs, who are forced to reinvent the wheel. Community producers rarely sell direct to end-users, and wholesale products may have to support a seven-fold price increase, or more. Container-load volumes, accompanied by hefty discounts, are the norm. It can be difficult, if not impossible, for community producers to meet the most basic requirements of export clients in terms of volume, deadlines, consistency and quality control. One serious misstep on the part of the producer is likely to terminate this fragile and unbalanced relationship.

Local markets, by contrast, represent a far more accessible and manageable outlet for community forest producers. Volumes are typically much smaller and clients more willing to tolerate idiosyncrasies in quality and consistency. If problems do occur, they can usually be resolved speedily and directly with local clients in a manner that is more likely to result in improved production in the future. Local transactions require little paperwork and shipping logistics are simple, making them much easier for local middlemen or artisans to maintain. Many of these advantages are predictable, but there are two other crucial and often overlooked factors that weigh heavily in favor of local markets for artisan furniture. The first is purely functional: Tropical woodwork that remains in the tropics is far less likely to suffer the splitting, warping and other structural defects that often result from the drastic dimensional changes that take place when tropical wood products arrive in a temperate climate (where most homes have central heating and/or air conditioning). The second is less tangible: local clients tend to validate the newfound social status achieved by recently trained GreenWood artisans, some of whom have been appointed to positions of responsibility in their local community. It's hard to measure pride, but a trained artisan is no longer a peasant or a subsistence farmer. The fact that he is respected in his own community and pursued by local clients makes him upwardly mobile in a way that may even exceed the boost he receives from sales and income.

Market access is crucial to the support of any forest product enterprise. GreenWood manages this complex environment by seeking a flexible balance between local, regional and export opportunities. Although community producers can almost always access and service local markets more successfully than international or even regional markets, they will likewise benefit by having multiple market opportunities and an adaptable marketing strategy.

Lessons from the field

The introduction of GreenWood technology in Honduras has been far from smooth. Over the years we have encountered just about every obstacle imaginable, many that we never saw coming! These range from inflexible and corrupt institutions to competition from illegal loggers and the potent lure of “*el Norte*,” which continues to drain Central American communities of some of their most talented sons and daughters. We've struggled, too, with our share of technical and logistical hurdles, including the limited financial resources of our own small non-profit organization. Only last year, as we were celebrating the culmination of more than two years of guitar-part production, a rogue hurricane descended on Honduras just after our sealed container left the kiln yard. We were lucky, and the container was merely waylaid for two weeks, but the unscheduled detour was not for the faint-of-heart. Some hurdles, like this one, we have been able to overcome by dint of good fortune or careful planning. Others we have come to accept as a cost of doing business in a challenging environment.

We also discovered that most obstacles present a corresponding opportunity. For example, GreenWood's decentralized, cottage-industry production system is inherently difficult to coordinate and manage. But it is also highly flexible, fosters broad participation in terms of age and gender, and adjusts to the competing demands of household obligations. Our own limited financial resources often result in lengthy gaps between workshops. But this encourages greater self-reliance and initiative among our artisans, and promotes cooperation with other local institutions. An example is our fortuitous alliance with a local trade school, whose instructors embraced GreenWood technology with enthusiasm and incorporated it in their regular woodworking curriculum, providing continuity between workshops and greater opportunities for students to practice their skills.

There is no recipe for sustainable development, but there remain several core principles that have guided the GreenWood program from the outset. The first is reflected by our focus on self-sufficiency and value. Handouts perpetuate a culture of dependency, so we give nothing away except information and technical assistance. Students buy their own tools; usually with the money they earn selling furniture.

The second core principle has to do with rigorous planning and follow-through. One-time training workshops are like seeds cast in the wind: they will not take root without the careful husbandry that follows.

Our third core principle is embedded in our commitment to “train the trainers” and to promote transparent business practices. When artisans and forest owners understand the real costs of management and production, and are capable of teaching themselves, they are well on their way to independence, and we are on our way to leaving.

As with sustainable development itself, there is no recipe or timetable for GreenWood’s departure from a client community. The needs and capacity of our participants are highly variable, and the resources that GreenWood can bring to bear in support of any particular client often depend on temporary grant funding or the participation of other collaborating organizations. Even within a single community group, one or two participants may begin selling products on their own after the first or second training session, whereas other students require much greater support. It is not uncommon for GreenWood-trained artisans to earn a significant portion of their production income (30 % or more) through direct sales that are solicited and managed entirely by the artisans, thus placing them firmly on the path to independence. In the community of Copén, Colón (see box above), two months of GreenWood enterprise generates income for the 25 members of the participating sawyer’s collective that is roughly equivalent to 95 % of the average annual per capita cash income from all other sources.

Technology and progress

From time to time questions are raised about GreenWood’s objectives and about our principles of appropriate technology. Skeptics ask whether in our adherence to traditional (some might say “old-fashioned”) practices, we are holding our artisans back, preventing them from pursuing their own interests or realizing their natural growth and potential. Some observers suggest that access to more sophisticated technology (the “march of progress”) is inevitable and that it offers an incentive for struggling artisans, who will otherwise lose interest, drift away or resume less productive activities.

In response, we are obliged to note that GreenWood does not (and could not) restrain artisans from moving on to other methods of production. Indeed, we assume that only a portion of the people we train will continue as professional furniture makers and that many of these artisans might eventually find work in other shops or related trades. GreenWood principles can be effectively applied to the manufacture of many different wood products and can be readily adapted to different kinds of technology. To that end, our instructors have taught bowl turning on bicycle-driven and electric lathes and have worked on the chainsaw milling of ship’s knees and the installation of a portable sawmill to be used in boat manufacture and the production of guitar parts. These activities are not only consistent with our original principles, but also excellent examples of how appropriate technology might be applied to a wide range of materials and products.

Technology does not follow a linear progression – from primitive hand tools to sophisticated machinery. In fact, much handwork is exceedingly sophisticated, whereas machine production

can be quite crude. We need only consider Curtis Buchanan's Windsor chairs, which are produced essentially by hand, using no mechanical fastenings. The demand for his furniture reflects the excellence of his design and construction, not the fact that he happens to use an electric lathe to turn legs or a light bulb to heat his kiln. The source of power is, in both cases, incidental. So much of modern woodworking consists of employing bigger, more powerful and more expensive machinery in an attempt - frequently unsuccessful - to force the material to perform an unnatural act. By comparison, the understanding, or "deep knowledge," of wood properties that an artisan acquires by working green wood with hand tools will inform and enhance whatever method of woodworking design or production he or she eventually pursues.

GreenWood cannot prevent artisans it has trained from joining the culture of mediocrity that commonly pervades the manufacture of wood products, but it is not our role - or in anybody's interest - to perpetuate this culture. If GreenWood artisans abandon hand-tool technology for machinery without having first mastered basic skills and an appreciation for good workmanship, they are likely to succumb to the widespread delusion that the quality of production (and the size of their income) hinges on the acquisition of newer and more expensive equipment.

An evolutionary approach to the introduction of new tools is more consistent with an understanding of appropriate technology. One might begin, for example, by modifying the motive force for a traditional piece of equipment such as the lathe with the addition of a small motor. Such an incremental measure would enable a skilled artisan to accomplish the same work more quickly and more effectively. But it would not fundamentally change the nature of an artisan's working method or the outcome, as would the introduction of a table saw, power planer and other conventional machinery.

These distinctions between craft process and manufacturing were succinctly characterized by British master craftsman David Pye as the "workmanship of risk" versus the "workmanship of certainty." The latter describes the predictability of automated production, whereas the former reflects the variability inherent in any manufacturing method that relies on the judgment and dexterity of the tool operator. As Pye pithily observes, "People are beginning to believe you cannot make even toothpicks without ten thousand pounds of capital. We forget the prodigies one man and a kit of tools can do if he likes the work enough." (Pye 1968)

If the irregular development of technology is, in part, responsible for the cultural inequities we have inherited, appropriate technology may play an important role in helping to address them. Sustainable economic development is, after all, about providing access to the tools that control human lives. But it will only succeed where those tools are well matched to the people who will use them and the resources that will be consumed in their application. "Give a man a fish and you feed him for a day. Teach a man to fish and you feed him for a lifetime" - so goes the ancient Chinese proverb. If we are serious about teaching artisans in the developing world to fish, we ought to begin with a hook and a line.

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THE ROLE OF SMALL AND MEDIUM FOREST ENTERPRISE ASSOCIATIONS IN REDUCING POVERTY

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Introduction

It is not easy for the poor to capture opportunities in forest harvesting and wood processing. It should be readily apparent, however, that small and medium forest enterprises (SMFEs) currently offer a significant proportion of those opportunities. They constitute 80-90% of all forestry enterprises and over 50% of forest sector employment in many countries (Macqueen and Mayers, 2006). But SMFEs face many obstacles, including insecure natural resource ownership and access rights, weak social stability and cohesion, little access to capital, poor market information, weak bargaining power, lack of technological know-how, geographical isolation and poor infrastructure, and limited knowledge of administrative and business standards and procedures.

External support for SMFEs is often absent, weak or poorly directed. Local collective action is therefore often the only option. Interventions that take local institutions seriously can enhance the already substantial benefits of collective action.



This paper draws heavily on lessons from field surveys of forest enterprise associations. IIED country research partners conducted surveys in Brazil (Campos *et al.* 2005; Figueiredo *et al.* 2006), China (Weyerhaeuser *et al.* 2006), Guyana (Ousman *et al.* 2006), India (Bose *et al.* 2006), South Africa (Bekula and Memani 2006) and Uganda (Kazoora *et al.* 2006). Macqueen *et al.* (2006) provide a summary of these. We define associations as: “user groups that band together about a common purpose and create organized institutions for collective decision-making.” This paper particularly targets external supporters wishing to enhance the contribution of such associations.

Forest-based associations take on different institutional forms (i.e., informal groups, associations, cooperatives, and companies). They also produce different types of forest products and services. Some manage private or common-pool resources, while others deal with processing activities far from the forest. Some involve local groups of individuals (often community-based) in which the association is the forest enterprise. Others are large umbrella groups that represent multiple enterprises. Local forest enterprise associations are recognised to be particularly important for poverty reduction.

Many recent studies have already examined how and why groups are successful (Futemma *et al.* 2002; Ostrom 1999). Generic lessons about what makes groups successful include (Macqueen *et al.* 2006):

- successful past experience;
- some disposable income (not impoverished);
- independence from political groups with the right to self organization;
- centrality to the total economy in which they operate;
- focusing on one manageable activity, potentially diversifying over time but retaining focus;
- either individual or participative leadership, provided it is home grown and fair;
- a homogenous composition, but they can do without it if they have good leadership;
- a mix of skills to achieve collective interests;
- origins without external support to prove competitive advantage;
- broader objectives than merely financial ones;
- clear boundaries defined by collective interests;
- initial flexibility followed by the evolution of simple rules and procedures based on local norms;
- regular and frequent meetings between members and leaders; and
- clear records, transparent decision-making and conflict-resolution processes and graduated sanctions for non-compliance.

This paper complements previous analyses in two ways. First, it adds information specific to forest-based associations, and second, it focuses on how to provide such associations with effective support.

Elements of poverty that forest-based associations address

Poverty is multifaceted, comprising:

- lack of access to basic needs (Mitlin and Satterthwaite 2004);
- insecurity and violence (ETFRN 2005);

- social isolation and powerlessness (Narayan *et al.* 2000);
- inhumane working conditions (ILO 2001);
- environmental degradation (Reid *et al.* 2005; and
- identity crisis linked to cultural disintegration (UNESCO 2005).

Working together through an association is one way to tackle each of these elements of poverty. Sometimes members join forces reactively in response to outside requirements or threats. Sometime they join proactively to pursue perceived opportunities.

Increasing access to basic needs

In many cases, the aims of associations extend beyond economic success to explicit social and environmental ends (Macqueen *et al.* 2005). In India, the Harda District Timber Merchant Association collects money and makes loans to particularly needy members who have suffered losses beyond their control (Bose *et al.* 2006). But these wider aims are not always present. For example, many associations in Brazil formed solely to take advantage of a government credit program, and they soon collapsed once this aim was achieved (Campos *et al.* 2005).

Associations can help reduce input prices and share transaction costs. They can also use collective bargaining to improve returns from sales. These options make member enterprises more profitable, which in turn helps members to get access to basic needs. For example, in South Africa, the Kwangwanase Association of small timber growers hires a truck at harvest time to reduce members' transport costs. The Sakhokuhle Association, an umbrella body with 1,400 small-grower members, has successfully negotiated better transport rates for association members wishing to sell their timber products. The Swayimane Small Growers Association in Warburg shares the costs of joint training workshops for its members on small-grower forestry (Bukula and Memani 2006).

Eliminating unnecessary intermediaries increases the benefits for poor producers. While some brokers play important roles in matching supplies from diverse producers with demand, this position of power can result in a poor deals for producers. To combat such problems, the Cooperativa dos Agricultores de Medicilândia in Brazil was formed with the express intention of restructuring the cocoa market chain. The aim was for producers in the State of Para to challenge the power of middlemen and large traders and so obtain prices comparable with other areas in Brazil (Campos *et al.* 2005).

Enhancing security and resolving conflicts

Associations have often proven effective in securing access to forest and financial resources. For example, the Guyanese Upper Berbice Forest Producers Association enabled members to gain access to a forest concession (Ousman *et al.* 2006). In Uganda, members of the Kamusiime Memorial Rural Development Association combined their land, allowing them to meet the required size required of 25 ha to be eligible for grants under the European Union-funded Sawlog Production Grant Scheme (Kazoora *et al.* 2006).

Conflicts often arise when authorities do not consult local people or recognize their rights. For example, Indian authorities introduced a new sales tax procedure (Form 38), which made tax collection much more cumbersome for local enterprises and led to unrest. The District Yamunanagar Plywood Manufacturers' Association took up the case in 2002. They called a general strike until the government withdrew the offending Form 38 (Bose *et al.* 2006). In central Africa, the Uganda Investment Authority created an industrial park encompassing areas with trees planted and managed by local farmers. The Uganda Wood Farmer's Association was formed specifically to sue the Uganda Investment Authority. The presiding judge in the

case ruled in favor of the farmers. He granted compensation equivalent to four tree rotations (Kazoora *et al.* 2006).

Inevitably, there are many examples where conflict emerges from the management of associations. In India, the Saharanpur Wood Carving Association in Uttar Pradesh, formed in 1960, initially succeeded in campaigns seeking favorable tax incentives and export policies. But disputes broke out among office staff in 2004, ultimately resulting in the resignation of the president. He then established the Saharanpur Wood Carving Manufacturers and Exporters Association, a direct competitor to the original association (Bose *et al.* 2006).

Overcoming social isolation and powerlessness

Individual SMFE's are often unaware of various support opportunities available to them, but associations can pool the knowledge and contacts of their members. They can also provide resources for dedicated people to undertake networking responsibilities. For example, representatives of the Kabakaburi Handicraft Association in Guyana secured funding from the Inter-American Institute for Cooperation for Agriculture, which enabled joint enterprise training in pottery, joinery/carpentry, sewing and craft making (Ousman *et al.* 2006).

Larger associations can create extensive networking opportunities for their members. For example, the Federation of Rajasthan Handicraft Producers in India has instituted awards for outstanding handicraft producers, organizes an annual symposium to share designs and runs seminars on trends in home furnishing. Visual merchandising and procedures for setting up export-orientated units are also a focus of the association. The association organizes workshops to promote exports of novel handicrafts, and leading members are provided with the opportunity to participate in European trade fairs (Bose *et al.* 2006).

In many instances, forming an association helps to secure training opportunities. For example, the Uganda Community Tourism Association used membership fees to provide training for members in tourism marketing, organizational strengthening and craft making (Kazoora *et al.* 2006).

On a cautionary note, associations can suffer from “elite capture” or corruption. Representatives of associations do, in some cases, abuse their positions to negotiate personal deals that can sometime leave associations in debt to outside interests. For example, the third board of directors of the Association of Rural Workers in the Boa Esperança/ Entre Rio settlement in Brazil became involved in the illegal sale of land plots and timber – taking a cut from each sale (Figueiredo *et al.* 2006).

Providing good employment opportunities

Joint investment through associations can create new jobs. For example, the Brazilian Cooperativa de Produção Agropecuária e Extrativista dos Municípios de Eptaciolândia e Brasília has already established a Brazil nut processing plant and has begun to expand operations to cover a wide range of ventures. It is now investing in salting, flaking, filling, and other processing equipment, and has plans to develop animal feed from Brazil nut shells. It also plans to launch a new range of rubber products, and to establish a pulp processing project for local palm fruit (Campos *et al.* 2005).

Associations are also more successful at attracting donor support for improved working facilities. Individual enterprises would, in most instances, find it very difficult to attract such funding. The Kamuni Women's Handicraft and Sewing Development Association in Santa Mission Village, Guyana, successfully applied to the Canadian International Agency for a new craft center fitted out with water tanks, five sewing machines and new furniture (Ousman *et al.* 2006).

In many instances, associations have facilitated group certification or fair trade initiatives, which are generally too costly for individual members. Certification support schemes provide detailed guidance on workers' rights, health and safety standards, and record keeping requirements. In the case of fair trade, they also sometimes provide a price premium for producers. In Papua New Guinea, community representatives established a company called FORCERT in 2003. The company links separate producers with Central Marketing Units that facilitate sales of products to overseas buyers. It has achieved certifications from both the Forest Stewardship Council (FSC) and the International Federation for Alternative Trade (IFAT) as a Fair Trade Organization (Dam 2006). The benefits have included increased employment opportunities, better working conditions, and the realization of a 20% price premium on the sale of the certified products.

Associations and unions have been at the forefront of the fight to help SMFEs remain viable and improve working conditions. For example, the Gujarat Timber Merchants' association in India has fought the closure of small sawmills due to strong conservation legislation (Bose *et al.* 2006). It should be noted that salary levels, worker's health and safety are often worse in SMFEs than within larger enterprises (May *et al.* 2003; ILO 2001). In addressing these shortcomings, associations face the challenge of overcoming scale inefficiencies, poor access to capital and a disabling policy environment.

Preventing environmental degradation

Local SMFEs are generally more accountable to local people than large external companies. There are many examples of good environmental management as a result. For example, indigenous peoples in the southern states of Mexico resented the degradation of their forests by outsiders. A group fought a successful campaign against imposed concessions. They won rights to operate their own micro-enterprises adhering to their own environmental values (PROCYMAF 2000).

In Guatemala, a company called FORSCOM was established by 11 member communities. The company manages community concessions and is FSC-certified, a prerequisite of the concession agreement (Leon 2006). While this can be considered a success, community level certification is relatively rare due to multiple complicating factors including:

- the disproportionate costs of certification for smaller scales of enterprise;
- the lack of capacity support for SMFEs within the forest certification movement; and,
- the dearth of mechanisms to distinguish and financially reward small or community-based forest enterprises that have been certified.

Additionally, issues of scale and power often favor larger enterprises in resource allocation, policy formulation and enforcement. The result is that SMFEs and their associations frequently cut environmental corners in order to compete. Associations can counter this tendency by using their collective voice to lobby for a fairer policy environment for SMFEs. For example, a member of the Guyana Manufacturers and Services Association lobbied for a new land-use strategy based around SMFEs that would increase forest revenues and employment without compromising sustainability (Mendes and Macqueen 2006).

Strengthening cultural identity

Cultural identity is extremely important to the many forest peoples of the world. It can be defined as: *"a set of distinctive spiritual, material, intellectual and emotional features of society or a social group, and that it encompasses, in addition to art and literature, lifestyles, ways of living together, value systems, traditions and beliefs"* (UNESCO 2002).

Various methods have been developed to determine cultural and sacred values in landscapes and in forest decision making (Rowcroft *et al.* 2006).

Cultures of forest peoples are not only a rich source of human diversity. They are also often deeply linked to the sustainable use of forests. For example, the indigenous peoples of the Upper Caura river basin in Peru formed an indigenous association, registered their cultural knowledge, mapped their customary land-use system and have developed sustainable management plans for the area - including co-management of existing protected areas (Colchester 2006).

Makushi communities in Guyana formed an association known as the North Rupununi District Development Board. The association developed small tourism enterprises that promote local language, dance and weaving. When self-assessing the most important assets within their communities, the Makushi identified culture as a key resource (Ousman *et al.* 2006).

Internal procedures that maximize association benefits

The benefits of forest enterprise associations in poverty reduction only come if associations are resilient and distribute costs and benefits fairly. A number of observations from country fieldwork show how this has been achieved in some cases.

Autonomous origins

There are considerable benefits associated with independent organizational beginnings, free from external interference. In Yunnan, China, political interference is strong, which leads to associations being weak. For example, the narrowly construed Yunnan Forest Products Industry Association currently does little more than hold an annual meeting. Another example exists in Uganda, where USAID supported COVOL in 1995 to improve shea nut butter production across 400 community-based organizations. This amalgamated into the Northern Uganda Shea Producers' Association. The combination of USAID's withdrawal in 2000 and subsequent disruption by the Lord's Resistance Army rebels led to the collapse of the association (Kazoora *et al.* 2006).

Many of the associations surveyed that had their origins in external support were in a state of crisis. In Brazil, the state agricultural extension agency founded the Associação dos Produtores Rurais em Manejo Florestal e Agricultura as a timber management project. Interviewees described little ownership by members, little trust in the leadership and little unity among members (Campos *et al.* 2005).

Accountable leadership with a history of social commitment

Members who have served well in a voluntary capacity are likely to make good leaders. For example, Ugandan informants regarded previous experience as the most important leadership quality after the ability to read and write. Many of the financially poorest associations have benefited from leaders who initially subsidized association activities, demonstrating deep personal commitment to the collective interest (Kazoora *et al.* 2006).

It also makes sense to invest in future leaders. For example in the association of the Settlement Project California in Mato Grosso, Brazil, young people make up 12% of the association members. The association has worked in partnership with the municipality and jointly they have developed programs at local high schools and built sports facilities in the settlement (Figueiredo *et al.* 2006).

Evolving procedures

Dynamic leaders can carry an association at the beginning, but long-term survival depends on well understood rules and procedures. For example, in Nova California in Brazil, two small rural producer associations joined in 1988 to form the cooperative called Reflorestamento Econômico Consorciado e Adensado. Founding members defined the initial objectives, but the cooperative has now evolved a unique organizational structure. Regional coordinators manage each area (male and female). A one-year membership trial period helps to build membership quality. Clear rules governing decision-making and the partitioning of costs and benefits are a major strength (Campos *et al.* 2005).

Associations that do not develop robust financial procedures quickly unravel. For example, doubt surfaced over financial mismanagement in the Amerindian Handicraft Association in Guyana due to a lack of clear procedures and accountability. Members quickly became reluctant to pay the 10% fee to the association required on the sale of craft products, with many opting instead to sell direct to buyers (Ousman *et al.* 2006).

Restricting focus to a few long-term issues

Keeping things simple at the start allows time for core expertise to develop. Most successful associations do a few things sustainably and well. Associations therefore need to balance immediate goals, such as markets for products, against longer-term interests, such as sustainable resource management. The Chico Mendes association in Acre, Brazil, originally started through Brazil nut collection alone. But it is now developing tree nurseries based on superior genotypes to reforest particular areas (Campos *et al.* 2005).

In Guyana, the Upper Berbice Forest Producers Association formed to achieve more secure jobs. Secure access to forests improved the viability and sustainability of timber production, while recognition of the low allowable timber harvest led them to diversify. New options include replanting manicole (heart of palm), fish farming and processing of non-timber forest products, but all these planned activities maintain a strict focus on strengthening working conditions for association members (Ousman *et al.* 2006).

Ensuring democracy and representation

Investing in democracy is one of the best guarantees of equity. For example, the Guyana Forest Products Association has monthly meetings of the 12-member elected executive committee requiring a quorum of six members, plus less frequent general membership meetings (Ousman *et al.* 2006).

Men and women often have very different livelihood concerns, yet the predominant trend is for there to be fewer women in leadership positions. For example, Ugandan women made up 53% of the members of the 62 associations surveyed, but only 44% of its leaders (Kazoora *et al.* 2006). A strategy in many countries is for women to create their own associations in order to have their interests represented. In the Caetés Settlement in Brazil, women producers formed the Association of Caetés Women because the two existing producers' associations failed to represent their interests (Figueiredo *et al.* 2006). In exceptional cases, associations develop strict gender equity requirements.

Larger associations frequently under represent smaller members. A large industrial association in South Africa, Forestry South Africa, has an executive committee dominated by large timber growers (five members), which carry more weight than medium growers (three members) and small growers (two members). The flourishing of many alternative small producer associations is one outcome (Bukula and Memani, 2006). In some instances, very large associations can benefit from sub-groups that deal with specific issues. For example, a papermaking sub-

group may develop within the Yunnan Provincial Forest Products Industry Association in China (Weyerhaeuser *et al.* 2006).

Making costs and benefits transparent

Trust grows when members know what their rights and obligations are. Developing clear procedures for costs and benefits and sticking to them can avoid corruption and abuse by powerful elites. One of the main contributors to the success of the Kamuni Women's Handicraft and Sewing Development Association is the meticulous financial record keeping of the stock held in the newly built craft sales centre (Ousman *et al.* 2006).

It is also vital that members perceive some advantage over non-members. Graded membership can build loyalty for continuing membership and can improve inclusion of the poor. In India, the FORHEX association has three types of members; founder, chartered and associate members. The latter pay reduced fees and receive partial benefits in comparison with the former two categories. The Madhya Pradesh Minor Forest Produce Cooperative Federation Limited has a set membership fee, but it distributes profits in line with particular activities: 50% to primary collectors, 20% for forest regeneration and 30% for infrastructure development (Bose *et al.* 2006).

Building in additional social benefits for marginalized groups can strengthen association unity. In Brazil, association barbecues and games proved to be an often-cited reason for belonging to the Association of the Settlement Project California (Figueiredo *et al.* 2006).

Developing clear conflict resolution procedures and effective sanctions

Personality differences and poor representation can lead to a fragmentation of associations, which negatively impact on their bargaining power. One useful strategy is to ensure space for “non-standard” meetings. Such meetings deal with contentious issues, new developments, the hosting of important visitors or discussing new government policies. In Uganda, 95% of the associations that remain have procedures in place to call such meetings (Kazooru *et al.* 2006).

Rewarding members and penalizing free riders helps to ensure the satisfaction of those who sacrifice the most. The credibility of the association (and the willingness to pay membership fees) often hinges upon how people who fail to pay are treated. For example, the Guyanese Orealla Fruit Cheese Women's Association, which makes forest fruit jams, stipulates an annual membership fee, commitment to waged work in the “fruit cheese” production facility and regular participation in meetings. The association expels members if they fail to pay the annual membership fee or if there is a two-thirds majority vote for expulsion (Ousman *et al.* 2006).

Effective support

With a recognized emphasis on the importance of autonomous and democratic decision-making in associations, what role should external agencies play in order to effectively support them? The following are suggestions for such support.

Make it easy and fair for SMFE associations to operate

Kaimowitz (2006) highlighted several major constraints for SMFEs; overregulation, trade liberalization with subsidies for the rich, and weak support services (credit, information and training). Overviews of SMFEs in six countries highlight the need for governments to level the playing field, with inequities in business registration, resource access and taxation being seen as endemic (Auren and Krassowska, 2003; May *et al.* 2003; Saigal and Bose, 2003; Sun and Xiaoqian, 2003; Thomas *et al.* 2003).

One general rule for support is to foster what already exists rather than impose or create what does not. In many cases, successful support emerges through genuine partnerships or response to demand from the association itself. In Mexico, the Union of Zapotec and Chinantec Forestry Communities (Uzachi) was established autonomously in 1989 following decades of private exploitation of their natural mixed pine oak forests. The Union then approached FSC and obtained certification in 1996. It has subsequently been able to attract greater financial and technical support and has increased status in the eyes of the environment ministry (Markoupoulos 2003).

Before rushing to push external loans or technical support programs, it is worth exploring what internal credit unions or revolving loan funds already exist. For example, the North Rupununi District Development Board in Guyana runs a women's revolving loan scheme, providing small loans at 5% interest rate. It also finances a larger North Rupununi Credit and Development Trust geared towards business start-up. This is initially repayable in 6-9 months, at which time borrowers can access a second larger loan (Ousman *et al.* 2006).

Likewise, forcing particular models of association can cause lasting damage. In Uganda there is a highly negative reaction to the "cooperative" form of association because of the high failure rates among government sponsored cooperatives in the 1980s (Kazooru *et al.* 2006). Years after the fact, this negative perception still persists.

Underwrite communication networks that link forest enterprise associations, markets and service providers

In very poor countries, the infrastructure to connect SMFEs and their associations to registration authorities, consumers and service providers is often absent. This may give the perception of poorly organized, informal enterprises, dispersed economic activity and excessively high risk. This in turn discourages government authorities, financial institutions and technical support services from attempting to assist these entities.

One of the most productive forms of support connects forest enterprise associations to the outside world and vice versa. For example, some of the success of the North Rupununi District Development Board in Guyana came from the tireless engagement and promotion of its activities by the Iwokrama International Centre for Rain Forest Conservation, which helped to link the association with various other donors (Ousman *et al.* 2006). In China, the Zhajaiwa Village's Persimmon Association posted information about its products in the Baoshan Forestry Bureau's publications and secured buyers from as far away as Shanghai (Weyerhaeuser *et al.* 2006). Umbrella associations such as the Budongo Forest Conservation and Development Organization or the Uganda Honey Association in Uganda act as support hubs for the development of better communication networks (Kazooru *et al.* 2006)

Many associations would also benefit from exposure to similar groups that can facilitate connections with those outside the association. Support through printed or radio bulletins, or by financing visits to trade fairs can be very useful. The Essential Oil Association of India publishes a journal entitled "Indian Perfumer," which presents the latest research and market information. It also sponsors workshops and seminars for member entrepreneurs (Bose *et al.* 2006). In Guyana, the Ministry of Amerindian affairs usefully sponsored a craftswoman from Kabakaburi community to train the Orealla Women's Group in the making of *tibisiri*¹ craft (Ousman *et al.* 2006).

¹ *Tibisiri* straw comes from the young shoots of native Guyanese palms and craftswomen then weave it into items that are very popular with tourists and local tradesmen.

Provide ways of distinguishing, and increasing the returns to, local forest enterprise associations in the market

Consumers are often willing to pay a premium for the social benefits linked to local forest enterprise associations, which are often community-based. The fair-trade movement already offers price premiums for many crafts made from timber and non-timber forest products. Such products are marketed and sold by Fair Trade Organizations when certified by the International Federation for Alternative Trade (Macqueen *et al.* 2006). Major timber buyers have expressed an interest in developing fair-trade timber in order to secure such premium prices (Roby 2005). Unfortunately, there is currently no product-specific label for timber available from the Fair Trade Labeling Organization that might allow mainstream traders to engage in the market for fair-trade products.

Despite well-publicized social concerns, the three major timber certification schemes (FSC, the Programme for the Encouragement of Forest Certification and SFI) fall short. They do not distinguish between small community-based products and products originating from large multinationals, a factor that disadvantages small local forest enterprise associations. They continue to face disproportionate costs for certification without seeing many economic benefits (Bass *et al.* 2001). A new alliance is calling for market mechanisms to address this deficiency, but such mechanisms will need to address the major gaps in mainstream trade, certified trade and fair-trade systems.

Conclusions

Small and medium forest enterprise (SMFE) associations can and do work where there is little else available to improve livelihoods and alleviate poverty, and therefore warrant support. Three priority areas require attention:

- **Make associations easy and fair:** In many countries the formal registration of different forms of association is still overly bureaucratic or centralized, and existing policies often marginalize SMFEs. Policy makers should find ways to reduce administrative hurdles and channel support through small and medium forest enterprise associations.
- **Subsidize information, training and association networks:** Communication networks and support programs can provide information and training on registration procedures, available finance, market trends, technological innovations, etc. Finding ways to support networking through trade fairs, workshops and seminars could also be very useful.
- **Develop market mechanisms that distinguish and reward local forest enterprise associations in the market:** Market access is a perennial problem for local forest enterprise associations. Creating mechanisms that allow SMFEs to distinguish their products and get better prices for them is a central issue.

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THE ROLE OF SMALL AND MEDIUM FOREST ENTERPRISE ASSOCIATIONS IN REDUCING POVERTY

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Introduction

When discussing community forestry, the forests often referred to are large, contiguous, natural forest areas with communities surrounding or living within the forest. However, small-scale agro-forests are a prominent type of community-owned forest in many developing nations and millions of people throughout the tropics rely on agro-forests to provide the majority of their income and subsistence. Such agro-forests usually consist of a wide diversity of trees, providing an impressive array of timber and non-timber forest products. Slow-growing, high-quality timber trees are often included in small-scale agro-forestry systems as a form of low-labor, long-term savings for farm families.

In Indonesia, small-scale farmers are already providing teak wood to local, regional, national and even international wood markets (via national factories). However, farmers selling such high-grade wood receive only a small portion of its value due to the long and complex supply chains involved in bringing the wood from the farmer to the end purchaser, and prohibitive licensing laws preventing farmers from having more direct market access. They are similarly



often overlooked for certification due to the complexity of organizing and sourcing from hundreds to thousands of small-scale agro-forests, despite the fact that many farmers' forest management practices already meet many of the certification criteria for sustainably-managed forests and that such community-produced wood could have a strong appeal to niche markets that focus on 'green' or 'socially responsible' products.

Another challenge when dealing with the management of agro-forests is how to ensure consistency and sustainability of supply. Most of the resources regarding sustainable forest management are focused on large-scale, contiguous forests. Even 'small-scale' forest literature often deals with forests of 50-500 ha in size. Articles on silviculture and sustainable management techniques for agro-forests on the scale of 0.5-5 ha are lacking. Creative twists on traditional forestry techniques must be applied when managing small-scale agro-forests which together comprise large areas of the landscape, but are being individually managed by many stakeholders with diverse goals. A successful example of such a creative twist is the Cooperative for Sustainable and Successful Forests, or KHJL, an organization which is the focus of this paper.

Historical background

In the early 1970s the national government decided to convert 38,959 ha of natural forest in Konawe Selatan (KonSel) District, Southeast Sulawesi, to teak plantations. People from local communities were hired to do the forest clearing and teak planting, and many simultaneously planted teak trees on their own allocated village lands at this time. The agro-forests that have since developed in the region contain a mixture of cash crops, including pepper, cocoa and cashew nut, as well as traditional crops. Trees also include fruit, firewood and timber trees (primarily teak - *Tectona grandis*).

Around 1999/2000 the KonSel teak plantations that were planted in the 1970s became mature for harvesting, but due to the lack of clear legislation, it was not apparent who was responsible for managing the area. In the absence of strong government control, the forests began to be recklessly cleared through widespread illegal logging. It was in this context that regional NGOs in Southeast Sulawesi became alarmed by the rapid disappearance of the teak plantations and decided to develop the concept for a Social Forestry Program in the KonSel District.

The Social Forestry Program in KonSel

The goal of the Social Forestry Program in KonSel was to stop illegal logging and improve community livelihoods by turning management of the state teak forest over to the villages surrounding the forest. The program was instigated in 2003 by a network of community-based, non-governmental organizations in Southeast Sulawesi known as Network for the Forests, or 'JAUH' (*Jaringan untuk Hutan*).

To begin, JAUH organized interested community members living in the 46 villages surrounding the state teak forest into groups at the village-level. JAUH did this through trained facilitators who were each assigned to live in the villages and help each village group to organize its meetings, elect group officials and determine group rules. These village groups, together with local government forest staff, were then engaged in participatory mapping of the state forest adjacent to their villages, using Global Positioning System (GPS) units.

After each village group was developed, the elected leaders of the group were sent to a district-wide forum to develop general rules for inter-village communication and organization. This forum was named the Organization for Communication between the Groups, or 'LKAK' (*Lembaga Komunikasi antar Kelompok*). Here the elected representatives also elected a secretariat committee in charge of convening meetings. They then officially applied to the national government for the right to manage the state teak forest. The government, however, insisted that only a legally registered business organization could apply for the right to manage the state teak forest, not an unofficial affiliation like LKAK. This requirement prompted the LKAK representatives to establish the Cooperative for Successful Sustainable Forestry, *Koperasi Hutan Jaya Lestari*, or 'KHJL'. The KHJL's Management Committee (MC) was comprised of community leaders elected by the LKAK. Also, as part of the legal requirements for cooperatives in Indonesia, a Monitoring Body of 3 community members was elected to monitor the activities of the KHJL Managing Committee and staff.

It was through this process that the communities created a strong, legally-recognized group structure in which members held decision-making and management power, and over which they felt ownership. Since the communities were involved in the design of the group structure from the beginning, they also had a strong understanding of its rules and the responsibilities of its members and leaders. This structure could then be used for communal decision-making, group marketing and as a legally-recognized structure through which smallholder farmers could get wood-related permits and sign sales contracts with factories or other market actors.

Once created, the KHJL then submitted its application to manage the state teak forest to the Ministry of Forestry for Indonesia. Unfortunately, the application was not immediately approved due to a perceived conflict between the Social Forestry legislation and previous Community Forest legislation regarding the process for granting state forest management licenses to communities. For one year, while the Ministry of Forestry and various national NGOs discussed this issue, the KonSel Social Forestry Program came to a standstill and illegal logging continued at a rapid pace. To date (over 3 years later) the matter has yet to be resolved at the national level.

Partnering with the Tropical Forest Trust (TFT)

As the state forest was being degraded, JAUH was losing community support for the Social Forestry Program. JAUH was also hampered by a lack of trained foresters or business managers on staff, and thereby had no one who knew how to manage the forest area sustainably or market the forest products. It was at this point that JAUH opened communication with the Tropical Forest Trust (TFT). The TFT provided the benefits of being able to provide training in sustainable forestry techniques and wood product processing, as well as a ready market for their teak and potential business investors.

The TFT specifically seeks to work with forests producing wood species that TFT member companies need for their supply chains. Since teak was in high demand among TFT members, the TFT was able to guarantee that there would be a ready market for the KHJL teak. The next condition allowing TFT to become a partner in the program was that the KHJL was willing to work toward FSC-certification of the forests it managed and had to agree to give preference to TFT members in wood sales contracts, as long as they matched the best-offered price for the teak. In June 2004, JAUH and the KHJL signed a Memorandum of Understanding with the TFT, which agreed to train and facilitate the KHJL in the sustainable management of its members' forests and business structure, as well as provide access to environmentally-conscious teak markets.

Institutional structure and legality

Initial discussions with the community members and JAUH revealed that, although the communities had formed the legally-registered cooperative, they had little understanding of what a cooperative was or how it functioned. Therefore, one of the first tasks for the TFT was to help them understand the structure and purpose of cooperatives, the concept of member ownership and dividend payment, the way cooperatives were democratically governed, and how profits were calculated and distributed. This training process was fundamental to raising members' understanding and faith in the cooperative system, as well as creating well-educated members with the capacity to hold the KHJL accountable to the laws governing cooperatives.

In most cooperatives, the Annual Member Meetings are open to all members and serve as the primary rule-making body of the cooperative. This function is difficult, however, when the members are spread out over a large area and those living far away are less likely to be able to attend such important meetings. As a result of the orientation on cooperative governance, the KHJL members decided that the KHJL Annual Member Meetings would instead be comprised of one elected representative from each village group, similar to the structure of the LKAK. However, since members still strongly wanted dividend payments paid to individual members, individuals still formed the membership unit, rather than groups. The participants of the cooperative's Annual Member Meeting then took on essentially the same structure as the original LKAK. It was therefore decided that the 'KHJL Annual Member Meeting' and the LKAK would be synonymous. Next, the meeting led to the decision that the elected LKAK Secretariat was desirable, but was to be incorporated into the KHJL structure by writing it into the KHJL constitutional by-laws. Through these by-laws, the two original organizations became one legal structure that the communities understood and felt ownership over.

Incorporating community teak into the business of the KHJL

While waiting for the communities to receive the license to manage the state forest, the TFT and JAUH were eager to train the village groups in forest management techniques. They thus decided that the KHJL could gain some basic organizational and forestry skills and earn some start-up money by engaging in the management and trade of teak that had been planted on the village and transmigration lands, commonly called 'community teak'. Since the original trees had been planted at the same time as the state forest, they were also now ready for harvest.

Once the basic structure of the cooperative was established and agreed upon by the community groups, the focus shifted to management rules for the community teak. A sustainable management system must be in place before market access is enabled, so that the international market does not quickly deplete local forests. FSC would be used as the standard for a sustainable management system. It was decided that the KHJL would apply for FSC-Certification under the Group Rules for Small and Low-Intensity Managed Forests (SLIMF). In this structure, the KHJL Management Team would act as the 'group manager,' ensuring that each of the individual members' teak management met the KHJL's general group standards. The document *Group Certification for Forests; A practical guide* (Nussbaum 2002) was used to guide the process.

Establishment of group rules needed to be done in such a way that the rules were created by the community members, based largely on the way they already managed their teak. Similarly, rules and processes would need to be tested on a small scale for applicability before being implemented in all 46 villages. Thus, 12 'pilot villages' were selected by the KHJL All Member

Meeting to undertake initial implementation of all new rules before they became officially part of the overall KHJL structure. In general, establishment of the group rules was conducted using the following circular process:

1. Through Participatory Rural Appraisal (PRA) techniques, village groups were facilitated to describe and document their current teak management system(s) and techniques.
2. Community group discussions were facilitated to understand the Forest Stewardship Council (FSC) Principles & Criteria (P&C), and compare their current system(s) with the criteria.
3.
 - a) If the group felt that their current system already met the FSC P&C, they were supported to document the system in terms of group rules and to explain why they believe it met the FSC standards.
 - b) If the group felt their current system did not meet the FSC standards, group processes were facilitated to create and agree upon simple group rules that would meet the standards, and were easy for villagers to implement.
4. A trial implementation of the rules in pilot villages then started, with regular review to analyze whether or not the rules were being followed.
5.
 - a) In cases of successful implementation, the rules were made permanent by asking the All Member Meeting for ratification.
 - b) In cases of unsuccessful implementation of rules, there was analysis on why the rule was not being followed, re-assessment of whether the rule was necessary and sufficient as written and simply needed better communication and enforcement, or if it could be changed slightly to better fit what members were doing while still meeting the FSC standards. If it was changed, the process went back to step 4.

To begin management of community wood, it was agreed in the All Member Meeting that 12 villages would be chosen as 'pilot villages', to experiment with initial implementation of the proposed group rules (step 4 above). In this way, problematic rules or procedures could be identified in the 12 pilot villages before training & implementation was extended to all 46 Social Forestry Villages. Another reason it was decided to focus on 12 pilot villages was that it was not clear how FSC assessors would view the KHJL system. By having an FSC assessment of the structure in 12 villages only, any major problems with certification would be identified before the system was replicated in all 46 villages. Additionally, if the KHJL system in the 12 villages was FSC-certified, then, as long as KHJL applied the same basic rules to newly-registered villages, new villages could join the certified system gradually overtime without the need for an additional FSC-assessment. Instead, each FSC Annual Audit would allow the assessors to check whether or not KHJL was still implementing its original system with all new villages and members.

Based on the process described, each of the 12 groups was guided through the development of draft rules. The rules were then categorized according to whether they pertained to individual members' teak management, institutional rules, or management protocols. The rules pertaining to individual management were combined in a single 'Membership Agreement' document, which all individually registered members would be required to agree to in writing. The institutional rules were ratified into the KHJL's constitution and by-laws, and the management protocols were documented as Standard Operating Procedures (SOPs).

Challenges in creating rules for agro-forestry management

Land Tenure

Throughout the process of creating group rules and SOPs a number of challenges unique to smallholder agro-forestry management were encountered. The first was the issue of smallholder land tenure. FSC Principle 2 requires that the forest area has secure land tenure. In Indonesia, the most official type of proof for land ownership for farmers is a Letter of Ownership (*girik*). In practice, to obtain this farmers are required to pay a substantial fee, plus go through a bureaucratic process requiring expensive bribes to complete. Only the wealthy and well-connected can usually secure such a document for their land. Instead, most villagers rely on their district Property Tax receipts ('SPPT') to show proof of ownership. Due to the common availability of SPPT's, the KHJL decided to make photocopies of this and use it as their required 'proof of land tenure' for each member.

Additionally, the head of each village (*Kepala Desa*) is responsible for keeping track of village land ownership, as well as collecting the land tax receipts. In some villages, the *Kepala Desa* will insist on keeping the land tax receipts, thereby denying villagers this proof of land tenure unless the villager submits a request to the *Kepala Desa*, (often accompanied with a bribe). Given the central role *Kepala Desas* play in village land tenure, letters from the *Kepala Desa* confirming land tenure also serve as a proof of land ownership in the region and were added to the KHJL's acceptable proofs of land tenure. Nonetheless, in some of the villages there were conflicts between individuals and their *Kepala Desas*, so potential members could not secure the proof of tenure necessary. In one extreme case, the *Kepala Desa* had a personal conflict with the elected village unit coordinator, and withheld proof of land ownership to all of the potential members in the unit.

To overcome this problem, the KHJL decided to produce a written document making a public commitment to pay all village taxes on wood harvesting and sales (these are taxes that are often left unpaid by illegal loggers). The immediate impact of this was that many village leaders thus decided to raise their local harvesting and sales tax, but discussions between JAUH, LKAK, the village units and the village heads convinced most village governments to keep the tax rise relatively low. This effort to recognize and adhere to village tax rules won the favor of most village heads and the problem faced by members in securing proof of land ownership were drastically reduced. It also served to improve local governance since it legalized payments made to the village, while providing the village government with operating funds.

Another land tenure-related problem raised by the Smartwood Assessors was how to ensure that registered village plots did not overlap with state forest land. Since the state forest boundaries had already been determined with local participation, marked in the field, and marked digitally on provincial forest department documents using GPS under the Social Forestry Program, this problem was relatively easy to solve. A process was created so that each registered member's teak plot location would be mapped using GPS, and the location of the plot would be marked on a digital map. Plots located within 300 m of the state boundary had to be assessed by a joint team of the member/plot owner, unit coordinator, one KHJL Management Committee Member and a district forest staff person. If the plot was found to be outside the state forest, an official letter was written by the Forest Department affirming its legality. If the plot was indeed shown to be in the state forest, the member was not allowed to register it with the KHJL.

The KHJL now keeps copies of proof of land tenure for each of its members. This provides a second source of tenure proof, outside that of the *Kepala Desas* and helps members invest more confidently in long-term crops, such as trees and teak.

Determining Annual Allowable Cut

Determination of Annual Allowable Cut for smallholder forestry plots was also challenging since teak trees were not spread out evenly across the landscape and were also of uneven age. Some registered plots would have as few as 5 trees, while others would be fully stocked with over 500 trees per plot. Plots also ranged in size from .25 ha to 5 ha. In Indonesian production forests, the most common system for determining Annual Allowable Cut is by dividing the entire production area by the rotation age of the timber tree, and creating annual harvesting blocks for each year of the rotation cycle. The wide variation in the density of teak trees per hectare for community teak made an area-based Annual Allowable Cut impossible to create.

Instead, the KHJL based their Annual Allowable Cut on the cubic meters of standing teak tree volume, as determined by a full member inventory of all teak trees over 10 cm in diameter. Teak trees with diameters 30 cm or more were considered to be of harvestable size. An estimation of teak growth rates for the region was provided by the local forest department as approximately 1.5 cm diameter per year. Based on this, it was predicted that the trees in the 20-29 cm range would take approximately seven years to enter the 30 cm diameter range, and thus the total standing volume of the 30+ cm trees should be divided by seven to calculate the Annual Allowable Cut.

The other challenge in determining Annual Allowable Cut is that the KHJL forest area per standing tree volume is not constant. As existing members register more teak plots, new members join, and some members may leave or pass away, the number of trees registered with the KHJL changes. Thus, the actual total standing volume for trees with 30+ cm is constantly changing, as is the Annual Allowable Cut. These changes can be monitored on an ongoing basis by the inventory team, who keeps a database of all registered teak trees per member and can calculate at any time the current Annual Allowable Cut and compare it with the volume already harvested for the year. Thus, Annual Allowable Cut monitoring is a constant and ongoing activity.

For the sake of clarity for co-operative members, Annual Allowable Cut is also calculated on a unit-by-unit basis, so that if one unit adds new members with teak trees over 30cm in diameter, their Annual Allowable Cut will go up, and if a member from that unit leaves the KHJL, the unit will see its Annual Allowable Cut go down. This helps village units understand the importance of long-term member commitments to the KHJL model, and the importance of harvesting within their Annual Allowable Cut. In practice, some units may not want to harvest their full Annual Allowable Cut each year, in which case, other units can cut more than their Annual Allowable Cut, as long as the unit that is over-harvesting realizes that in the future they will need to under-harvest, and allow other units to cut more. Thus, the total KHJL Annual Allowable Cut is set and monitored on an on-going basis, while the village units' Annual Allowable Cuts are provided more as general guidelines for members and unit coordinators.

Harvesting Distribution

Once the Annual Allowable Cut is determined, the cooperative must decide which members' trees will be harvested each month. Through discussions with community groups, it was found that villagers often use their teak trees as a form of savings, to cut when the household needs a large sum of money, such as for wedding ceremonies or medical emergencies. Farmers therefore cannot predict 20 or even five years into the future when they would like to harvest their teak. Instead, a highly interactive process was established to determine which farmers would harvest their teak each month (running over 3-4 months):

1. First, the KHJL Management would send lists to each unit of which members had completed all their registration requirements and, based on the inventory of their land, had teak trees over 30cm and ready to harvest.

2. The KHJL Management team would also send an estimate of the proportional amount that could be harvested from each unit and still stay within the annual allowable cut.
3. The Unit Coordinators (UC) would then call a unit meeting to find out if any of the members on the list would like to harvest their teak. Based on this meeting, the UC would send a list of willing members back to the KHJL.
4. The KHJL Management reviewed each list of ‘willing members’ and selected the members whose teak would be harvested each month.

Using this system, flexibility in the harvest timing for villagers was retained, while the KHJL was guaranteed to stay within its Annual Allowable Cut.

Harvest Licensing and Simplification of the Supply Chain

One of the major barriers KonSel smallholders faced in regard to market access was that of obtaining the licenses necessary to legally harvest, sell and transport teak from privately owned land. To legally harvest and sell more than 10m³ of teak from village and transmigration lands in KonSel District, a Community Land Harvesting License (*Ijin Pemungutan Kayu pada Tanah Milik*), or ‘IPKTM’, is required. According to local district law, the following list of documents is needed in order to be granted an IPKTM:

1. Proof of land ownership, specifically an official Letter of Land Ownership.
2. A recommendation letter from the Sub-District Head.
3. A recommendation letter from the Head of the local Forest Department Branch.
4. Permission letters from the landowners.
5. A map of the land made by the Head of the local Forest Department Branch.
6. A survey report of the standing tree volume on the lands where harvesting will take place.
7. An approval letter from the Head of the District.

Clearly, the requirement for extensive documentation and number of government approvals involved in gaining harvesting licenses excludes most smallholder farmers from ever securing such a license for harvesting their own wood, and selling their wood directly in city markets or to factories. Due to this licensing system, a chain of production has developed in the region whereby wealthy, well connected individuals who can invest the large amounts needed to secure an IPKTM, function as wood traders buying wood from farmers, taking care of all the necessary licensing and transport, and re-sell it to factories with a large profit. Since District Heads usually only issue IPKTM licenses to one or two individuals at a time, the wood trader often has a monopoly on wood buying in the district.

One of the first challenges for KHJL was how to gain the start-up funds necessary to secure the IPKTM and take on the role of the ‘wood trader’. The KHJL however, would be a wood trader managed by communities and help local farmers by paying the highest possible price for their wood, limiting the difference between buying price and selling price to the actual costs of operations, without taking an excessive profit at the expense of farmers. This approach was taken to ensure that the participating farmers receive the best price on the market and would be less tempted to sell to outside buyers. Furthermore, it would help to avoid corruption among the cooperative’s leaders, who would be responsible for safeguarding all profits until the end of the year at the annual member meeting where profits were divided among the members as dividend payments. Many previous cooperatives in the region failed when farmers did not get fair prices up-front, and then saw their dividends disappear when corrupt leaders pocketed them. To secure the start-up funds, the TFT gained assistance from a member

factory and retailer who provided the start-up funds for licensing to the KHJL as a short-term, no-interest loan, to be paid back through cash or wood sales over the first few years of operation.

Benefits of FSC certification

Once KHJL had clear member rules, registered members with inventoried teak, and an IPKTM license to legally harvest and sell teak in the region, it was ready for FSC-assessment and certification. But the question still remained: was FSC Certification really necessary, and how would it benefit the KHJL? Clearly, the main initial reason KHJL worked toward FSC Certification was because as a pre-requisite to partnering with the TFT, a partnership that brought them free forestry and business training, no-interest loans and international market access. Since TFT members were prepared to also cover the costs of the FSC assessment, applying for certification was a low-risk decision for the KHJL.

Besides partnership with the TFT, the KHJL also received other benefits from FSC certification. First, since there is already an international niche market for FSC-certified teak, the KHJL could be relatively certain that there would be a price premium associated with FSC certification. Second, FSC certification brought international recognition and credibility to the KHJL as a forest management unit with the capacity to sustainably manage forest areas. This international credibility helps the KHJL in its bid to manage the state forest area by countering the usual reason for national government officials to withhold management rights: communities' lack of capacity to sustainably manage forests. Finally, the recognition brought by FSC Certification helped KHJL members to access national forest trainings, discussions regarding forest governance and community forest conferences. In this way, FSC certification has helped the KHJL as an institution to keep abreast of ongoing forest technologies, techniques and laws.

Keys to sustainability of the KHJL

Clear member benefits & price premium

The greatest key to the sustainability and success of the KHJL is its ability to bring a multitude of benefits to its member farmers. KHJL members all receive training in best management practices for teak, as well as free teak seedlings to plant on their plots each year. Membership fees are kept low and when KHJL makes a profit, members receive a modest dividend each year. But the most important direct benefit to members is the price premium they receive by selling teak to the KHJL. Members reported the KHJL buying price to be up to 100% higher than the previous price offered by wood traders. Many members also admitted to previously working for illegal logging companies, but decided to leave this work when they saw that they could make more money by selling the teak from their own land than that teak from state forests (It is also a KHJL membership requirement that all members refrain from illegal logging activities). As long as KHJL continues to provide a price premium well above competitor teak prices to its members, it will continue to have a growing membership and forest area for management. Similarly, the price premium indicates to farmers that there is a strong market demand for teak, and encourages them to plant more teak on their land, thus increasing the future teak supply for the KHJL.

Transparency & accountability: long-term monitoring by JAUH & TFT

Transparency of management practices and strong systems for monitoring corruption are also necessary to sustain the success of the KHJL. This monitoring depends on members understanding their rights and actively holding their elected managing committee (MC) accountable for good institutional and financial management. Currently, JAUH and TFT also serve as monitors to ensure that corruption is not being practiced in the management of the KHJL. If the KHJL MC is perceived to be swindling funds, they will quickly lose legitimacy. KHJL has already selected certain MC members to be responsible for training new members and others for monitoring financial management. As long as members and the leaders assigned to monitoring tasks continue to take their jobs seriously, corruption will be minimized. Time is needed, however, for the KHJL to develop a culture of transparency and accountability independent from TFT and JAUH monitoring. Most likely JAUH & TFT will need to continue as monitors long after they are no longer needed for economic support or training for capacity building.

Economic Sustainability

Finally, economic sustainability is crucial for the KHJL. In the first year of KHJL's operations, the KHJL made a profit in its first year of management (if profit is calculated according to the amount of money earned through wood sales, minus the amount of money paid for operations expenses and loan repayment). Approximately 30% of this profit was divided as dividend payments to members, who received up to twice as much back as they paid in membership fees at the beginning of the year. This also helped the KHJL gain legitimacy with the regional communities, and many more farmers registered as members in 2006 than 2005.

However, TFT continues to support KHJL economically by 1) allowing them to pay back the no-interest loan on a 'per container' basis; 2) covering the costs of FSC Certification and 3) using some of the loan money to pay 3 inventory staff salaries. If the costs of all the inventory staff salaries, along with FSC Annual Audits are figured into the profit calculation, the KHJL would still make a profit, but it would not currently make enough profit to support its Management Committee.

Future economic sustainability therefore largely depends on:

- 1) KHJL's growing capacity to become economically independent through a smooth and gradual transition away from donor funds;
- 2) KHJL's ability to 'scale up' by expanding its forest area through inclusion of more members and more village groups;
- 3) KHJL's ability to incorporate 'value adding' activities to its business, such as a system for setting wood prices by grade and offering sawn timber or eventually furniture;
- 4) KHJL's access to markets being appropriate to its scale, allowing flexibility in dealing with communities, and being equipped to gain a price premium for the wood that is FSC certified; and
- 5) KHJL's ongoing ability to function efficiently enough to ensure members clear price premiums and dividend payments, while still covering its operational and staffing costs.

Conclusion and potential for replication in other regions

Keys to success

Although only two years old, the KHJL is so far a successful case of sourcing and certifying high-value timber from smallholder farmers' agroforests. In summary, the the key ingredients in KHJL's success as an organization so far include:

1. The group structure resulted in a simplified supply chain and, due to the assistance of TFT and JAUH, was credible in the eyes of the government and the international market.
2. The program began small, in 12 pilot villages, with a simple system for gradual growth over time. Monitoring is provided to ensure that the rate of production growth does not outstrip the rate of community capacity development in business management.
3. The KHJL was linked to key niche markets of appropriate size, which were able to capitalize on the environmental and social aspects of the wood source and pay premiums for FSC-certification.
4. Before production began, a system was put in place to sustainably manage the wood source based on actual inventory data. Well-known annual allowable cuts limited the amount of wood KHJL could harvest and sell in any given year.
5. Intensive training and capacity-building was given to community managers so that they could meet the demands of the international markets in aspects such as:
 - a. Wood Quality
 - b. Reliability in meeting contract commitments
 - c. Consistency of supply over time
6. Initial start-up funds were provided together with training in business planning and management.
7. The program has the long-term support of an outside monitoring body, and will gradually be weaned off its financial and training support.

Opportunities for replication

The question, however, remains as to whether such a model can be replicated elsewhere? In conclusion, the key conditions that have contributed to the success of the KHJL model, which would most likely need to be present for successful replication of the model elsewhere, include the following:

1. Smallholders in the region are already providing wood to national and international markets (i.e., there is a ready supply and market for the wood).
2. Smallholders already include the target tree species in their traditional agro-forest systems (i.e., traditional forest management systems for the trees are already in place).
3. A complex chain of custody prevents smallholders from receiving high prices for their wood, or regional laws or economic conditions have created a monopoly situation in which smallholders have little choice regarding who to sell their wood to, and wood traders make a substantial profit. This situation could be overcome through a group organization of farmers equipped with initial start-up funds.
4. There is a regional NGO(s) or business network prepared to facilitate the smallholders in group structure establishment and training in forest and business management techniques; especially including documentation and formalization of current sustainable traditional techniques being used, and assistance in initial implementation and on-going monitoring.

This list clearly excludes situations in which wood produced by smallholder farmers is only used and sold locally and is not sufficient to direct to national or international markets. It also excludes situations where smallholders already have direct access to national and international markets, or where there is already a simplified chain of supply and strong competition for farmers' wood. In these situations it would be hard for a group structure to provide much of a price premium to members, and farmers would be less likely to commit to sell their wood only to the group. However, group structures may still be useful in helping farmers gain access to capital and selling goods collectively.

This case study serves as a detailed example of a model in which a group organization of smallholders selling teak successfully gained FSC certification, but more importantly, created a system that provides clear and potentially sustainable benefits to its members. KonSel communities are already recognizing the usefulness of the group model and beginning to explore the possibility of selling other agroforest products, such as pepper or cocoa through the cooperative. It is hoped that the details about the KHJL system provided here can offer both inspiration and information for other similar programs throughout the world.

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NEW BAMBOO INDUSTRIES AND PRO-POOR IMPACTS: LESSONS FROM CHINA AND POTENTIAL FOR MEKONG COUNTRIES

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Introduction

Oxfam Hong Kong (OHK) and the Mekong Private Sector Development Facility (MPDF) have carried out a bamboo sector feasibility study for Viet Nam, Lao PDR and Cambodia¹. The Study was conducted in close conjunction with a bamboo value chain pilot led by MPDF in Thanh Hoa province, Viet Nam which over the past 18 months has been carried out in partnership with the domestic private sector, farmers and international buyers².

¹ Feasibility Study (US\$ 250,000) jointly funded by OHK and MPDF.

² Supply-chain pilot (US\$ 315,000) main donor IFC - MPDF. Other contributions from M4P project of ADB, IKEA.



Together, the study and the pilot demonstrate that an efficient high-value pro-poor industry includes the critical component of near-source pre-processing of bamboo. Near-source pre-processing, where farmer businesses split the culms into parts and channel these parts and residues into separate product chains, creates an efficient industrial supply-chain. China, having coupled this supply-chain innovation with technology and new product development, has led the growth of the now US\$ 7 billion global bamboo market, which also include bamboo shoots and handicrafts. The industry where 75% of the total market value is pro-poor - in terms of farmer returns and worker salaries - has potential for the Mekong countries as a scaleable rural industrial model, transferring value to growers, creating viable local businesses and leading to more widespread economic transformation.

Government, donors and development agencies have made large investments to tackle poverty in the region. While these efforts may have contributed to development in general, the evidence shows that they have been less effective in tackling more entrenched issues in remote and upland communities. Development of integrated value chains for bamboo products, appropriate training and technology, access to capital, business development services and practical government policies are required for the poor to access markets and transform poverty.

This paper presents findings and conclusions from the feasibility study which was composed of contributions by more than 20 consultants from 14 organizations who carried out component studies in Viet Nam, Lao PDR, Cambodia, China and globally during the first half of 2006. The study explored the potential of the sector through analyses of bamboo resources and farming systems, technology processes, global and domestic product markets and business environments. This paper presents a selection of the analysis and main conclusions including:

- Recent developments in the bamboo industry.
- The global bamboo market.
- Potential for the bamboo sector in Mekong countries.
- Lessons from China.

Recent developments in the bamboo industry

New commercial uses of bamboo

Many people's experience of bamboo products is limited to sitting on bamboo furniture and matting, using bamboo baskets or using bamboo chopsticks to eat some bamboo shoots. The last 15 years has seen a dramatic growth in the variety of commercial bamboo products such as flooring, laminated furniture, building panels (similar to timber-based plywood, chipboard or MDF), high quality yarn and fabrics, activated carbon and bamboo extracts,. The emergence of bamboo as a timber substitute has coincided with a growing demand for timber. Bamboo's appearance, strength and hardness combined with its rapid growth cycle and capacity for sustainable harvesting make it an increasingly attractive wood substitute. The market outlook for bamboo is strong.

These recent developments have created new opportunities for bamboo markets to be targeted for rural development and poverty reduction. In particular, the emergence of near-source value-adding in modern supply-chains increases the sector's potential economic impact on poor rural communities. The feasibility study shows that in Viet Nam today, every ton of bamboo used for producing bamboo flooring has almost 5 times the pro-poor financial impact than if it were used to make paper.

Bamboo in three distinct sub-sectors

It is useful to divide the sector into three stand-alone sub-sectors:

1. Handicrafts: characterized by manual processing and extremely high value-adding to relatively small volumes of raw bamboo.
2. Bamboo shoots: a high-value agricultural food crop that can also be grown in parallel with the production of culms.
3. Industrial processing: semi-mechanized and mechanized processing of large volumes of bamboo culms. The industrial processing sub-sector offers many opportunities for major growth and pro-poor impacts on rural farming communities. Industrial processing can be further divided according to the value of the processing and the grade of material used:
 - Premium processing (eg. flooring, laminated furniture)
 - Medium value processing (eg. chopsticks, mat boards)
 - Low value and bulk processing (eg. charcoal, paper & pulp)
 - Unprocessed culms (eg. scaffolding and traditional construction)

Premium processing requires the highest value parts of the bamboo, typically the middle lower part of large culms. Lower value products can be made with upper and residue parts. So modern bamboo supply-chains now comprise different businesses producing a variety of products, with premium bamboo parts going for high value uses such as flooring, laminated furniture, mid quality parts going to medium value-added processing such as blinds, mats, and chopsticks, and the leftover or residue parts, such as the use of sawdust in paper, charcoal or chipboard.

The pre-processing revolution in bamboo

The revolution in the industrial bamboo sub-sector began in China 15 years ago when it was forced to innovate in response to scarce timber resources. Previously, factories would purchase whole culms for production and were forced to deal with mountains of culm residue and waste. This led ultimately to technical and supply-chain innovations which produced the critical supply-chain step of pre-processing. At, or near-source, pre-processing workshops with specialized but simple machinery separate bamboo culms into various parts and direct these parts into different supply-chains. This creates industry-wide efficiency and greater value-adding at the local level.

The revolution in industrial bamboo practices permitted transportation and waste handling savings, the potential for 100% utilization rates and zero wastes, in short, resulting in a model for achieving maximum resource utility. Business, research institutes and government all contributed to the technology development driving this innovation.

The new premium processing industries generate the highest rates of pro-poor development of all the industrial bamboo processing industries. However, they cannot exist in isolation and must operate within a diversified industry for maximum industry-wide value and value creation.³

³ Zhejiang Province in China now has more than 20 industrial plant and equipment suppliers providing the specialised equipment required for all levels within the industrial supply-chain from pre-processing to production lines for premium end products

World bamboo market and Mekong countries' potential

Overview

The Study estimates that at present, bamboo markets have a combined annual value of approximately US\$ 7 billion⁴. Traditional products account for almost 95% of this value. Newer industries offer growth potential and are expected to rival traditional bamboo-related markets over the medium-term.

Markets for bamboo can be grouped into 'traditional' and 'non-traditional' or 'emerging' markets. Demand remains strong in traditional markets such as handicrafts, blinds and bamboo shoots with profitable opportunities despite moderate growth. Other traditional markets, such as chopsticks, are highly commoditized with low growth and low profit margins. Emerging bamboo markets include flooring, building products and laminated furniture. These represent the largest growth opportunities for bamboo⁵.

Strong international demand coupled with China's export growth and existing bamboo-based industries has produced a growing bamboo sector within wood-based product industries. Supply problems, including the high demand for certified timber, create a positive market outlook for bamboo. Overall prospects for a diversified bamboo sector look strong.

Growth and future global bamboo markets

Current demand is heavily concentrated in traditional bamboo markets. But growth for bamboo products is highest in the emerging wood product substitute-based markets. The scale of future demand for bamboo products will be driven by:

- Global market growth rate: Growth in global markets in which bamboo products compete, and are linked to global GDP growth.
- Penetration rates of bamboo into these global markets: Driven by attitudes of buyers and the price/performance competitiveness of bamboo products compared to alternatives.

We explored various growth scenarios, and conservative 'mid-level' scenarios are reported.⁶ The 'mid-level' scenario estimates that by 2017, the total market for bamboo products will be around US\$ 17 billion, with much of this growth coming from the non-traditional segment of bamboo products, including laminated furniture, flooring and panels.

Mekong bamboo sector potential

Two approaches have been used to develop scenarios for the Mekong sector:

- **Demand Driven:** through analysis of the potential share of the global bamboo markets that could be captured by the Mekong region.
- **Supply Driven:** through analysis of the development of the sector under different industrial models.

⁴ Including: handicrafts, bamboo shoots, chopsticks, blinds, flooring, furniture, panels, builders' joinery & carpentry, charcoal and activated carbon. Excluding paper/pulp and unprocessed bamboo used in construction and household uses.

⁵ Additional niche market opportunities exist for processed bamboo charcoal driven by growing demand for bio-fuels. Bamboo-based activated carbon has the potential to develop strongly in the growing activated carbon market.

⁶ The complete feasibility study contains more data and justifications on these scenarios.

Demand driven scenarios

The assessment of potential market share is informed by analysis of current production levels in the Mekong bamboo industries as well as national export performance in other light manufacturing and agricultural sectors. Mekong countries already capture a good share of some world markets (e.g. 3% of wooden furniture with Viet Nam and growing at over 40% per annum, 7% of coffee exports and 7% of global exports in basket and wickerwork).

Given the Mekong countries' demonstrated ability in bamboo production, three different 2017 world market share scenarios of 2%, 5% and 8% are used for each of the 10 bamboo product industries. The feasibility of each is then estimated based on the current state of each of the domestic bamboo industries and the past performance in other similar industries (Table 1).

Demand driven scenarios suggest that under favorable domestic conditions, by 2017 the Mekong sector could be worth around:

- US\$ 0.6 billion p.a. by capturing a greater share of the existing world bamboo markets (World Bamboo Market Scenario 1 - zero growth)
- US\$ 1.2 billion p.a. by capturing a greater share of a growing world bamboo market (World Bamboo Market Scenario 2 - mid-level growth)

Table 1: “Demand driven” Mekong scenarios

Industry	World Bamboo Market Scenario 1					World Bamboo Market Scenario 2				
	World market (US\$ m)	Mekong Market Share (US\$ m)			Estimate (US\$ m)	World market (US\$ m)	Mekong MarketShare (US\$ m)			Estimate (US\$ m)
		(Existing market - zero world growth)	2%	5%			8%	(Future mid level world growth)	2%	
Handicrafts (Bamboo & rattan)	3,000	60	150	<u>240</u>	240	4,200	84	210	<u>336</u>	336
Bamboo shoots	1,500	30	75	<u>120</u>	120	1,700	34	85	<u>136</u>	136
Wood furniture	1,100	22	<u>55</u>	88	55	5,600	112	<u>280</u>	448	280
Wood flooring	100	2	5	<u>8</u>	8	1,200	24	<u>60</u>	96	60
Wood panels ⁷	200	4	10	<u>22</u>	22	2,200	44	<u>110</u>	176	110
Blinds (incl. fish gear)	500	10	<u>25</u>	40	25	1,200	20	<u>60</u>	96	60
Chopsticks	300	6	<u>15</u>	24	15	400	8	<u>20</u>	32	20
Charcoal	100	2	<u>5</u>	8	5	130	3	<u>7</u>	10	7
Activated carbon	20	0	<u>1</u>	2	1	170	3	<u>9</u>	14	9
Paper/pulp ⁸	n/a	n/a	n/a	n/a	80	n/a	n/a	n/a	n/a	110
Raw bamboo ⁸ /construction	n/a	n/a	n/a	n/a	60	n/a	n/a	n/a	n/a	60
Total	6,825	137	341	552	630	16,830	337	842	1,346	1,185

These scenarios show that within the existing world bamboo markets (scenario 1) handicraft, bamboo shoots and paper would continue to be the main bamboo industries of scale in the Mekong. However, in a growing world market (scenario 2), furniture would become

⁷ Viet Nam production of pressed woven mat boards is estimated at US\$ 22 million, hence current market share may be 11%

⁸ Paper/pulp and raw bamboo market size data is not presented as it was not reviewed during this study. However, estimates of future Vietnamese bamboo paper/pulp production and raw bamboo consumption for domestic demand are included here to better illustrate the overall potential scale of the sector.

increasingly important and begin to rival handicrafts as the leading Mekong bamboo industry. Flooring, panels and blinds would also become industries of scale.

When grouped by sub-sector, the growing importance of industrial processing becomes apparent.

Table 2: Contributions of each sub-sector under different scenarios

Sub sector	Mekong Demand Scenario 1 (Existing market- zero world growth)		Mekong Demand Scenario 2 (Future mid level world growth)	
	Overall financial output (US\$ m)	%	Overall financial output (US\$ m)	%
Handicrafts	240	38	336	28
Bamboo Shoots	120	19	138	12
Industrial Processing (incl. Raw culms)	270	43	710	60
Total	630	100	1185	100

The evidence from the recent trade performance of the Mekong countries demonstrates that these scenarios are achievable. Other commodities in which the Mekong countries have achieved similar world export market shares include:

- 8%: Footwear, basketwork, ornamental ceramics, pepper, coffee.
- 5%: Rice, men and women's overcoats, natural rubber, bicycles.
- 2%: Wooden furniture, various garments and agricultural products.

Furthermore, the required growth rates appear to be feasible, if bullish, as they are within the range of annual growth rates achieved by Viet Nam in several similar sectors since 1999. Of particular relevance may be the emergence of the wood furniture sector, which has grown from US\$ 12 million in 1999 to US\$ 1.1 billion by 2004, a sustained average annual growth rate of over 40% per annum (ITTO 2004 & 2005).

Supply-driven scenarios

Supply-driven scenarios for the Mekong bamboo sector are based on the available resource base relevant to each of the sub-sectors.

- **Handicrafts and Shoots.** In the case of the handicrafts and bamboo shoots sub-sectors, they require only 24,000 ha (Demand Scenario 1) and 36,000 ha (Demand Scenario 2).
- **Industrial Processing.** A key variable in the resource scenario is the sustainable yield per ha of bamboo. This is approximately 9.5 tons per ha per year ("luong" bamboo) in the active bamboo processing areas of the Mekong countries covered by the study. In Anji, China, in 2003 the maximum yields achieved by farmers were around 14 tons per ha per year of Moso, an equivalent quality and type of bamboo. Average yields across China are around 9 tons/ha.

Current official estimates for bamboo in the three Mekong countries are: Viet Nam 1.4 million ha, Lao PDR 1.5 million ha and Cambodia 30,000 ha. Allowing for some unreliability in these

government estimates⁹, we can still assume a total area of 500,000 ha would be available for bamboo production in the Mekong countries.

The “New industrial model” explained below is used to illustrate the potential scale of the sector.

Table 3: “Supply driven” Mekong sector scenarios

Sub sector	Mekong Supply Scenario 1 500,000 ha, 9.5 t/ha/yr		Mekong Supply Scenario 2 500,000 ha 14 t/ha/yr	
	Area of bamboo (ha)	Financial output (US\$ m)	Area of bamboo (ha)	Financial output (US\$ m)
Handicrafts	24,000	336	16,000	336
Bamboo Shoots	36,000	138	36,000	138
Industrial Processing (New industrial model)	440,000	495	448,000	729
Total	500,000	970	500,000	1,200

Table 3 summarizes the likely scale of industry that could be supported under different supply scenarios. The supply scenarios indicate that under current raw material production practice and yields, an area of 500,000 ha of bamboo could support an industry worth US\$ 970 million per year. With improved production practice and increased yields the same area of 500,000 ha could support an industry worth US\$ 1.2 billion per year.

Summarizing 2017 Mekong potential

Linking Mekong demand and supply side scenarios with global bamboo market scenarios provides the overall estimate of potential for the Mekong. Table 4 indicates that the conservative mid-level global economic growth scenario could result in a US\$ 1.2 billion per year bamboo sector in the Mekong countries.

⁹ OHK and MPDF are currently funding remote sensing work to upgrade these estimates.

Table 4: Summary of Mekong sector scenarios

Sub sector	Mekong Scenario 1 (Existing market - zero world growth)		Mekong Scenario 2 (Future mid level world growth)	
	Financial output (US\$ m)	%	Financial output (US\$ m)	%
Handicrafts	240	38	336	28
Bamboo Shoots	120	19	138	12
Industrial Processing (New industrial model)	270	43	710	60
Total	630	100	1185	100

Socio-economic and environmental impacts

The potential socio-economic and environmental impacts of the sector have been assessed using a combination of the following measures.

Socio-economic impacts:

- **Overall financial impacts:** the total output value of the sector or supply-chain.
- **Pro-poor financial impacts:** At the center of this approach is the use of measurements for pro-poor financial impacts. These are components of the overall financial impacts linked to waged income, and income to farmers and small businesses close to sources. The feasibility study suggests that this typically amounts to around 75% for the sector (except for products like pulp/paper).
- **Employment creation:** the total number of Full Time Equivalent (FTE) jobs created in farming, pre-processing, secondary processing and associated activities such as transport and loading, trading and wholesale.
- **Total direct beneficiaries:** the total number of workers and farmers gaining direct benefit from the sector. The number of direct beneficiaries will be higher than the FTE employment creation as most farmers only spend part of their time growing bamboo.
- **Distribution of benefits between men and women:** the percentage distribution of benefits analysis between men and women is also carried out for each supply-chain, based on the share of employment creation.
- **Rural distribution of benefits:** the distribution of employment creation along each supply-chain, between farmers, traders, pre-processing and secondary processing workers, is used as a proxy measure for the potential geographical distribution of benefits and hence, the potential for benefits to be captured by more remote, poor communities. The summary indicator used is the percentage of jobs with potential to go to rural communities which is assumed to equal employment creation among farmers, traders and primary processing workers.

Each of these measures is expressed in two forms:

- **Efficiency of impact:** measures the rate of employment creation and financial impact (pro-poor and total) created throughout the sector per hectare of land committed to

bamboo production. This measure permits very clear policy and strategic decision-making, and permits a comparison of benefits with competing options for land use.

- **Scale of impact:** measures the overall scale of impact indicators above.

Environmental Impacts

There are two main environmental considerations from the supply side:

- **Raw material production:** Does the cultivation and harvesting of bamboo have discernable positive or negative environmental impacts?
- **Processing:** What are the main environmental impacts of the different processing industries?

Pro-poor financial impacts

The feasibility study methodology sought to determine how much created value is captured by poor communities, compared with those being captured as profits by larger businesses, imported items costs (fuel), interest payments, or other expenditures that do not attribute value to the local rural economy.

We have used the term “pro-poor financial impact” to describe this local component of total revenue that is captured by poor communities. Part of the study fieldwork included surveys of business cost bases. The data allows the calculation of the proportion of total costs spent on the main “local” costs, such as labor and bamboo processing inputs and provides estimates of profit margins and other main costs.

Bamboo resources and labor together typically represented approximately 80% of the total cost of production for most bamboo processing industries with profit margins of approximately 7% (ranging typically from 0 to 12%). At the processor level, approximately 75% of revenue is captured by local costs compared to approximately 7% taken as profits. The notable exception is paper, where we measure that only 33% of revenue is captured locally.

These estimates reflect the “factory gate” price paid for bamboo. Factory gate pricing includes the total local value-added and profit captured by farmers, traders and transporters along the local value-chain. It includes local costs such as raw material, labor, local fees and profits of farmers and local traders, but also transport costs. When bamboo businesses are sourcing bamboo from poor rural communities, this is a useful approximation of the value captured by poor communities.

However, these estimates are only proxy measures. The main limitations are that they might be subject to include:

- Under-estimating the total pro-poor impacts as they do not reflect the wider impacts of reinvestment of profits and surplus capital by farmers and local traders back into the local economy; and
- Over-estimating the direct pro-poor impacts as they also include transportation fuel costs and do not differentiate between the benefits captured by non-poor farmers and traders and those actually classified as poor. For example, the study found that when transported up to 20km fuel costs may represent around 10% of the factory gate price.

Subsequent stages of work will look more precisely at attribution of value at various points in the market-chain, and wider secondary impacts of supply-chains. For the purposes of a feasibility study, the assumptions above are regarded as reliable in indicating the pro-poor nature of the supply-chains.

Efficiency of impact

“Efficiency of impact” is a measure of total supply-chain impact arising at all points along a domestic value-chain expressed per hectare of source bamboo production.¹⁰ It is determined for each of the individual industry supply-chains for the five socio-economic measures outlined above (Table 5). The analysis is based on data obtained by the feasibility study from farmers, traders and businesses operating in each industry.

Table 5: Efficiency of impact of bamboo industry supply-chains

Industry segment	Overall financial output US\$ per ha	Pro-poor financial impact US\$ per ha	Job creation FTE per ha	Total beneficiaries farmers+ workers per ha	Local Costs % of total costs	% women in supply-chain % FTEs	% jobs in rural communities % FTEs
Handicrafts (VN)	143,000	11,300	39	40	85%	60%	95%
Bamboo Shoots (China)	3,800	3,100	0.4	1.1	90%	31%	100%
Flooring (VN)	3,100	2,400	1.2	1.9	85%	49%	35%
Chopsticks (VN)	1,600	1,300	1.1	1.8	85%	49%	46%
Woven mat (VN)	1,100	1,000	0.9	1.5	100%	42%	100%
Mat board (VN, panels)	1,300	810	0.8	1.5	70%	46%	98%
Charcoal	600	420	0.2	0.9	75%	37%	95%
Charcoal (briquettes, Lao PDR)	320	180	0.3	1	60%	38%	79%
Paper + pulp (VN)	1,500	490	0.3	1	35%	38%	66%
Raw culms (VN)	360	360	0.1	0.8	100%	31%	100%

The most critical measures from a pro-poor perspective are the rates of pro-poor financial impact and employment creation. Against these two measures, the analysis in Table 5 confirms important differences between and within the different sub-sectors.

- **Handicrafts:** Very high rates of pro-poor financial impact and employment creation per hectare of bamboo are seen due to the highly manual processing of relatively small volumes of bamboo, with most benefit gained by small-scale processors and factory workers. This supports the argument that handicrafts are a distinct sub-sector, based on the sale of skilled craft labor rather than of large volumes of bamboo material.
- **Bamboo shoots:** Deliver high levels of pro-poor financial impact per ha due to the higher prices and yields of shoots compared to culms. In this sense, shoots are a high value agricultural crop. However, shoot farming creates relatively little employment. Most of the financial benefits are retained by farmers themselves and not distributed along the supply-chain.
- **Industrial processing:** From a pro-poor perspective, three distinct industry groups emerge within the industrial processing sub-sector: Low-value and bulk; medium-value; and, premium processing.

¹⁰ In line with experience from China, the analysis allows for a further 10% employment creation in related activities such as handling, transportation, trading and wholesaling.

Low-value and bulk processing industries, such as charcoal, paper and pulp, have low rates of both pro-poor financial impact and employment creation. They achieve only marginally higher levels than selling unprocessed raw bamboo culms to the construction industry. This lower impact is partially offset by the fact that the industry can utilize low quality bamboo, leftovers and processing waste from other industries and various species.

Medium-value processing industries, such as chopsticks and mat boards (panels), create similar levels of employment as the premium processing industries, but only half the pro-poor financial impact per hectare of bamboo. However, they are able to use lower grades of bamboo than premium processors.

Premium processing industries, such as flooring, have the highest rates of pro-poor financial impact and employment creation of the industrial processing industries, but require premium quality bamboo. Their rate of economic impact is twice the level of the medium-value processors and five times the level of the low-value and bulk processors. Similar results are demonstrated in China for laminated furniture industries

Table 5 indicates this differentiation across products. Premium products require high value raw bamboo (species, culm size and quality) creating farmer income. They also create more jobs in the supply-chain. But only certain parts of the culm can be used for premium products, so the value from premium products can only be realized through the development of an efficient mixed industry which is maximizing the utility of all parts of the plant. The critical factor to establishing a mixed industrial sub-sector is the presence of near-source pre-processing workshops which process bamboo culms into various parts (including waste), which are then transported to other factories for secondary processing (into paper, blinds, flooring etc). This innovation in the supply-chain structure enabled China to reduce prices and enter a range of new product markets. It shifts material utilization rates from the current levels of sometime less than 30% in Mekong to upwards of 95% in China, increasing overall industrial sub-sector efficiency. Sector ‘industrial mix’ options for a bamboo industrial sub-sector based on 50,000 ha of bamboo for Viet Nam or Lao PDR are shown in Figure 1. Thanh Hoa Province, Viet Nam is the most advanced in its supply-chain and approaches the ‘Medium Mix’ scenario.

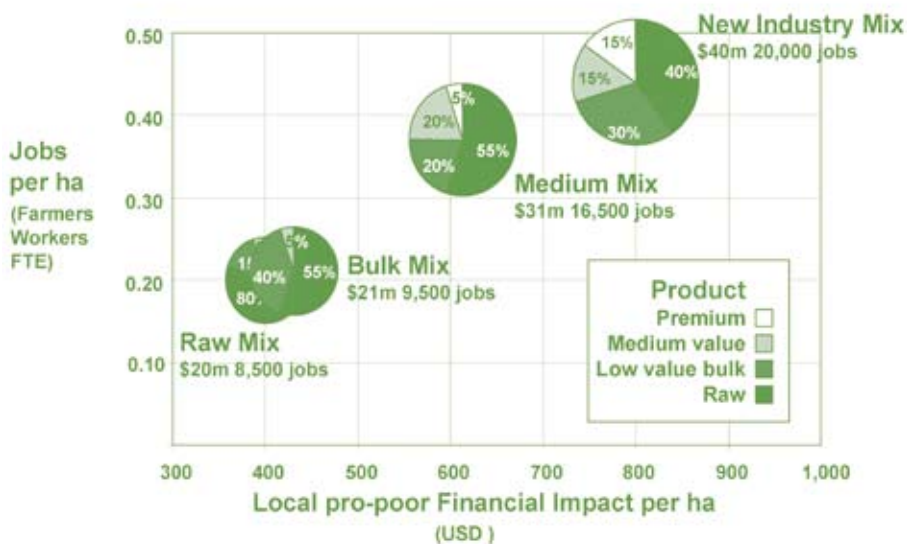


Figure 1. Comparison of the impact of the four product segments as policy choice¹¹

¹¹ Supply-chain “industry mix” scenarios for 50,000 ha.

Scale of impacts

The previously developed Mekong 2017 scenario of a US\$ 1.2 billion bamboo sector (Table 4) combined with the rate data from the feasibility study and Table 5 provides an overall scale of impact across the various indicators (Table 6).

Table 6: Potential scale of impact of the bamboo sector by industry segment

Industry Segment	Mekong Potential (Capturing a greater share of growing world markets)					
	Pro-poor financial impact US\$ millions	Financial output US\$ millions	Employment creation FTE	Total direct beneficiaries People	Area of bamboo ha	World bamboo market US\$ millions
Handicrafts	266	336	920,000	936,000	24,000	4,200
Bamboo shoots	111	136	16,000	41,000	36,000	1,700
Wood furniture	217	280	106,000	170,000	90,000	5,600
Wood flooring	46	60	23,000	36,000	19,000	1,200
Wood panels	100	110	68,000	127,000	85,000	2,200
Blinds	47	60	41,000	44,000	4,000	1,200
Chopsticks	16	20	14,000	23,000	12,000	400
Charcoal	5	7	1,000	2,000	11,000	130
Activated carbon	6	9	1,000	3,100	18,000	170
Paper/pulp	35	110	18,000	69,000	72,000	n/a
Raw bamboo	60	60	24,000	141,000	167,000	n/a
Total	909	1,185	1,232,000	1,592,000	538,000	16,830

The industry is separated into three independent sub-sectors: handicrafts, bamboo shoots and industrial processing. At a sub-sector level, the analysis leads to the following conclusions:

- **Handicrafts** are the most important source of employment creation, accounting for more than 75% of all employment in the sector under both scenarios. The pro-poor financial impact of handicrafts is substantial though they deliver relatively minimal benefits to farmers.
- **Bamboo shoots** represents the smallest of the three sub-sectors, but its high financial impact rate means that it provides 10%-20% of the pro-poor financial impact from employment rates of just 1% - 2%.
- **Industrial processing** emerges as the largest sub-sector in terms of pro-poor financial impact, accounting for up to 60% of the total pro-poor financial impacts of the sector. The sub-sector also consumes by far the largest share of bamboo (over 85%) and so is the most important sector for delivering large-scale benefits to poor farmers.

Environmental impact

Cultivation and harvesting: Bamboo has a number of environmental benefits as compared to industrial economic development options. The main environmental benefits of bamboo include:

- Bamboo is a sustainable cropping system for sloping lands, reducing soil erosion, and delivering sustainable farming systems;
- Bamboo is suitable for the recovery of degraded lands;
- Bamboo reduces rain run-off and downstream flooding and retains water within the watershed;
- Bamboo's rapid growth rate and selective harvesting sequesters up to 12 tons of CO₂ per hectare. It releases 35% more oxygen than equivalent areas of trees; and
- Bamboo may be produced with comparatively low inputs of fertilizer and pesticides (proposed models in this analysis have zero inputs assumed).

However, one main drawback is the biodiversity risk from the development of bamboo monocultures, but this risk needs to be considered in relation to the costs of alternative land use options.

The wider environmental impacts are primarily driven by the extent to which bamboo products are used as a substitute for hardwood and slow-growing timber. Greater use of bamboo as an alternative to hardwoods should contribute to a slowing in the depletion of tropical forests, with corresponding benefits for bio-diversity, conservation and carbon sequestration.

Processing industries: The main industries of concern from an environment perspective include paper/pulp and fiberboard production. The use of large quantities of chemicals and the production of significant volumes of wastewater pose serious environmental concerns to the local environment.

In other industries, the main potential environmental impact is from processing wastes, such as chips and sawdust, but also the chemicals used in the treatment of bamboo (e.g. hydrogen peroxide and borax). The volume of bamboo waste would be reduced in the proposed industrial models.

Summary of impacts

Each of the sub-sectors can make an important contribution to rural development and poverty reduction. However, as shown in Table 7, there are important differences in the nature of their impacts. The stars in the table show levels of impact, with one star representing low impact and five stars representing high impact.

Table 7: Summary of potential impact for Mekong bamboo sector, 2017.

Sub-sector	Overall impact	Impact scale			Impact efficiency			Gender bias of impact % of FTEs to women	Rural bias of impact % of rural FTEs	Environmental Impact
		Pro-poor financial impact US\$ millions	Financial output US\$ millions	Job creation FTE (000's)	Pro-poor financial impact US\$ per ha	Financial output US\$ per ha	Job creation FTE per ha			
Handicrafts	****	***	***	****	****	****	****	****	****	****
		266	336	920	11,300	14,300	39.2	60%	95%	
Bamboo shoots	**	**	*	*	****	****	*	*	****	****
		111	136	16	3,100	3,800	0.4	30%	100%	
Industrial Processing	****	****	****	****	**	**	**	**	**	**
		532	716	296	1,113	1,498	0.6	45%	62%	
Total		909	1,185	1,232	1,690	2,203	2.3	56%	87%	

The table shows that:

- Handicrafts are most important for employment creation and have the highest impact efficiencies, although delivery of benefits to farmers is relatively minimal.
- Bamboo shoot production is a high impact niche that primarily delivers high levels of benefits to a relatively small group of farmers.
- Industrial processing is most important for overall pro-poor financial impact and is the only sub-sector capable of delivering widespread benefits to farmers.
 - Premium processing has a high rate of financial impact efficiency, comparable to bamboo shoots, but on more than double the scale. It also creates more employment than all other areas, with the exception of handicrafts. The scale of the industry should be maximized to take full advantage of available premium grade bamboo.
 - Medium value processing creates substantial employment and pro-poor financial impacts. It has impact rates typical of the industrial processing sub-sector as a whole and should be expanded as part of a diversified industrial processing sector.
 - Low value and bulk processing have impact rates of only on fifth of premium processing industries, and correspondingly low total pro-poor impacts. However, the industry has an important role within a diversified industrial processing industry as a value-added user of low grade bamboo, leftovers and processor of waste from other industries.
 - Supply of raw culms has the lowest rate of pro-poor impact, but is an unavoidable part of the sector due to bamboo's great versatility.

Conclusion

Clear market growth opportunities coupled with appropriate conditions in the Mekong countries offer opportunities to access growing global bamboo markets. The experience from China shows that under the right conditions, bamboo can be a lead sector for rural industrialization and large-scale poverty reduction.

Bamboo industries have been a key driving force in rural industrialization and widespread poverty reduction in Anji county, Zhejiang province, one of China's 10 "bamboo homelands". The benefit has been distributed across the whole population, with average household incomes for the population increasing by 220% in the first ten years of the bamboo boom.

Some researchers have suggested that the greatest impact was the catalyzing effect that bamboo had on the diversification of income opportunities (Ruiz-Pérez and Belcher 2001).

Features for success

Several features were crucial to the dynamic growth of the sector in Anji:

- Strong demand and favorable market conditions:
 - Located in the heart of the Yangtze Delta region, close to the major Yangtze Metropolis around Shanghai and Hangzhou, Anji is ideally located to meet market demand.
 - China's logging ban in the 1990's created additional demand for timber substitutes and led to a 10% -15% jump in bamboo prices over a single year.
- Consistent, sustained leadership from the Chinese Government targeted the development of the bamboo sector as part of economic development planning;
- Parallel development of processing industries and bamboo resources created a "virtuous circle" of demand for farmers products, increasing value-addition and capital in the local economy, as well as reinvestment and diversification of income opportunities;
- Local development of specialist processing technologies and equipment ensured appropriate, affordable equipment was available;
- Minimum scales of production suited to the resources of farmers, SME's and local enterprises [e.g. typical area of bamboo in Anji was 0.6 ha per household (Ruiz Pérez, *et al.* 2004)];
- Lower perceived market risks due to diversity of uses of culms and shoots, leading to greater attractiveness of bamboo for farmers and processors; and
- A readily available existing bamboo resource and a tradition of growing bamboo enabled exploitation of emerging market opportunities.

In addition, there were three pre-requisite policy reforms that paved the way for the rapid development of the bamboo sector in China, and will also be an important consideration for the Mekong countries.

- Land tenure systems: Clear land ownership and usage rights, characterized by 30-50 year land leases that allows for the transfer of rights to family and others;
- Supportive business environment: creating the conditions for a vibrant private (and collective) sector, especially small and medium enterprises; and
- Market liberalization: Opening up of the economy to allow access to international markets and investors.

At the local level, several further points are worth noting:

- Heavy public investment in the development and dissemination of local processing technologies greatly increased their affordability and accessibility to local enterprises;
- Intensification of raw material production was critical to output growth with yields rising to 8.9 ton per ha from 4.9 ton per ha between 1978 and 1998. The area of bamboo cultivation increased by 16% while production of culms increased by 98%; and

- Bamboo shoot production generated sufficient value for farmers to be a stand-alone industry driving poverty reduction, as happened in Li'nan County, but it also provided opportunities for diversification for bamboo farmers.

Recent developments and emerging lessons

Recent developments that have contributed to the growth of the industry, while also presenting new challenges, include:

- Emergence of a pre-processing industry, which greatly assists in achieving very high “added value” utilization rates of the bamboo harvested;
- “Nieyou” a traceability system in Anji allows for easy identification of the age and source of culms and is linked to harvest quotas and regulated by the Forestry Bureau. It has the potential to form the basis of an effective “Certification” or “Chain of Custody” system;
- Quality is becoming an increasingly important requirement in the global market. Anji, and China as a whole, have not yet established a reputation for providing this;
- Raw material shortages and rising bamboo prices (USD\$ 85 per ton for “moso” culms in early 2006) are squeezing profit margins and limiting the output of individual businesses that are unable to secure enough raw material;
- Decreasing profit margins and excessive competition in several markets have driven increasing commoditization of some products; and
- Bamboo demand is driving an increasing risk of monoculture development and adverse biodiversity impacts, and attention to land use management policy is required.

The Mekong Countries' Potential

Both Viet Nam and Lao PDR have extensive bamboo resources. With comparative advantages in both raw material and labor costs, as well as an ability to develop competitive economies of scale (Viet Nam, in particular), the prospects for the Mekong countries look strong. The scale of the opportunity for Lao PDR is more modest and will be maximized by linking with cross border supply-chains (Viet Nam, Thailand, and China).

The opportunity for Cambodia will also be modest, but is still considerable compared to the current size of its market. There remain business environment challenges in attracting investment into the large scale businesses required to achieve volumes in new bamboo supply-chains. Compared to Cambodia and Lao PDR, Viet Nam stands poised to develop a large bamboo sector in the Mekong, and can work as an engine for linked market opportunities for its Mekong neighbours.

The Mekong bamboo sector is poised for significant growth and widespread pro-poor impact. The feasibility study demonstrates that with appropriate support, it can grow from a US\$ 250 million industry to a US\$ 1 billion-plus industry by 2017, an industry with around 1 million jobs and a supply-chain structured so that 75% of the financial impacts are pro-poor. The associated supply-chain pilot in Thanh Hoa, Viet Nam has shown early signs of this potential with recently introduced supply-chain innovations resulting in a dramatic increase in near-source value addition and job creation. The details of this impact will be presented in subsequent reports from MPDF. Preliminary analysis shows that there are now a total of 10 new or converted pre-processing workshops creating 539 new jobs. Annual salaries from these are US\$ 294,000 (US\$ 550 per annum per worker) in an area where average incomes are less than US\$ 100 per annum. Workshop sales of slats (pre-processed inputs to secondary processors to make high-value laminated products) have gone from zero to US\$ 26,000 per quarter over a period of 6 months, a result of introducing the pre-processing supply-chain innovation from China. On the production side, 533 ha of bamboo have been planted with direct support, and on the basis of

current prices, will generate US\$ 159,000 per annum starting from 2010. Raw material demand is increasing, and prices have increased 20% to the benefit of farmers.

Transferring resource development, industrial supply-chain development, and technological and management experiences from the global market leader (China) is necessary and achievable as an important driver of the bamboo sector in the Mekong. Appropriate, targeted support is needed to create progressive farming and business environments and to ensure financial viability and good returns on investment for farmers, processors and others in the supply-chain. This will help expand the success of the supply-chain pilot, and enable an impact of the scale indicated in the feasibility study, thereby creating substantial pro-poor income into the future and potentially creating hundreds of thousands of new jobs in the Mekong region.

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