

The use of pigüe (*Piptocoma discolor*) by smallholders in Napo, Ecuador

Sustainable management of a pioneer timber species for local livelihoods

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Key points

- In the Ecuadorean Amazon, the tree species pigüe (*Piptocoma discolor*) provides important revenues to supplement rural household incomes in times of financial need.
- As a pioneer species that regenerates in disturbed forest and fallows, pigüe is well suited for sustainable management.
- Pigüe is mostly used to produce boxes to transport fruits and vegetables in the region, playing an important role in the marketing of agricultural produce.
- As an artisanal industry, the milling and fabrication of pigüe products is an important source of employment and income in some rural parts of Napo province.
- The availability of milling equipment and facilities is essential to the value chain associated with the processing of pigüe wood, which is easily produced by rural families without external inputs and assistance.
- The regulatory framework for species such as pigüe should be adjusted to facilitate production, given the species ecology that makes it abundant and resilient.

“Under the radar” timbers produced by smallholders in Amazonia

In rural Amazonia, local people produce and market many types of timber for a variety of uses ranging from permanent construction materials to packing materials for shipping (Romero et al. 2011). Whether a certain kind of lumber is traded and used locally, nationally or internationally depends on a number of factors including its hardness, color and other physical and mechanical properties (Gatter & Romero 2005). Woods for which there is high international demand -- many of which are also scarce slow-growing natural forest trees -- are increasingly out of the reach of local residents, including those living in the expanding urban areas of Amazonia. For this reason, local demand has led to growth in the market for faster-growing, lower quality timbers (Padoch et al. 2008; Merino 2010; Romero et al. 2011).

In some cases, the use of such “under the radar” timbers allows people with less money to find niches for wood products that generate income, often in ways well adapted to their customary livelihoods. This brief presents recent research on the production and marketing of pigüe, or *Piptocoma discolor*,

a tree species native to Amazonia and Central America (Figure 1). Pigüe is a fast-growing soft wood used extensively in the Ecuadorean Amazon to make pallets and small crates for the transport of fruit from rural production zones to local and regional markets (Romero & Robles 2011). Due to its regeneration ecology (Box 1), pigüe is produced by farmers through management of fallows, an ecological niche in which the species grows naturally.

Production and marketing of pigüe logs by families in Napo province

Following 11 key informant interviews in Ecuador’s Napo province, pigüe was identified as an abundant and economically important species widely produced and marketed by families in the study area in Cotundo parish. Two main production corridors along the E45 highway and the Hollín Loreto Coca road were selected based on interviews with informants, and 10 small sawmills were identified and visited. Through interviews with five of the mill owners, as well as with truck drivers, we identified 12 producer communities. The leaders of seven of these



Figure 1. Map of collected specimens of pigüe indicating the distribution of the species in the Amazon region and beyond. Data acquired from Missouri Botanical Garden and New York Botanical Garden online herbaria.

Map: M. Agus Salim

agreed to facilitate interviews with producer families. All the communities, in which we interviewed a total of 30 producer families, are ethnic Kichwa who hold land collectively but assign individual *fincas* (farm properties) to families. These interviews provided an understanding of the pigüe business.

According to informants, sales of pigüe products started in the 1990s, when a number of small mills specializing in making fruit crates appeared in the study area. After 2000 demand for pigüe *tucos* (logs measuring approximately 1 m in length and 30–45 cm in diameter) grew quickly. When sawmills need logs, they contact community leaders who spread the word to others. Prices are negotiated directly between mill owners and producer families, who sell to a number of different mills. Producers cut the logs to order and move them to the roadside for pick up. Among the informants interviewed, the typical family had harvested and sold pigüe five times, with harvests typically occurring every 2 to 3 years. For each interview, the value chain described by informants was graphically represented to understand common arrangements among activities and actors (Figure 3).

In our sample all 30 producers managed natural regeneration of pigüe in fields of 5 to 10 ha left fallow after a 3-year cycle of agricultural production. Naranjilla (*Solanum quitoensis*), a citrus-flavored fruit in the tomato family, was the most

Box 1. Species description of pigüe, a wind-dispersed species that regenerates naturally in agricultural lands



Figure 2. Pigüe tree in bloom. Abundant small aster-like flowers produce wind-dispersed seeds borne by a feathery parachute.

Photo: Mary W. Farmer

Pigüe is a fast-growing soft wood tree in the Asteraceae (aster) family (Figure 2). It can grow to a diameter of up to 60 cm and a maximum height of 30 m and features a cylindrical trunk with branching above the lower third (CDC 2011; Zamora et al. 2000). In Ecuador, the species grows in well-drained clayey and silty soils in both early and late secondary forests of the Amazon region (Espinoza and Moser 1989; Jorgensen and Leon 1999). A pioneer species, pigüe readily regenerates naturally in clearings through dispersal of its seeds, which are wind borne by parachute-like floral scales typical of the aster family (Almeida et al. 2004; CDC 2011). Because of these characteristics, the species is naturally abundant in shifting cultivation systems and is also found in monodominant stands in secondary forest.

important agricultural product to most families in the sample (57%). Large mature pigüe seed trees are maintained near fields to maintain the cycle of propagation. Following natural seed

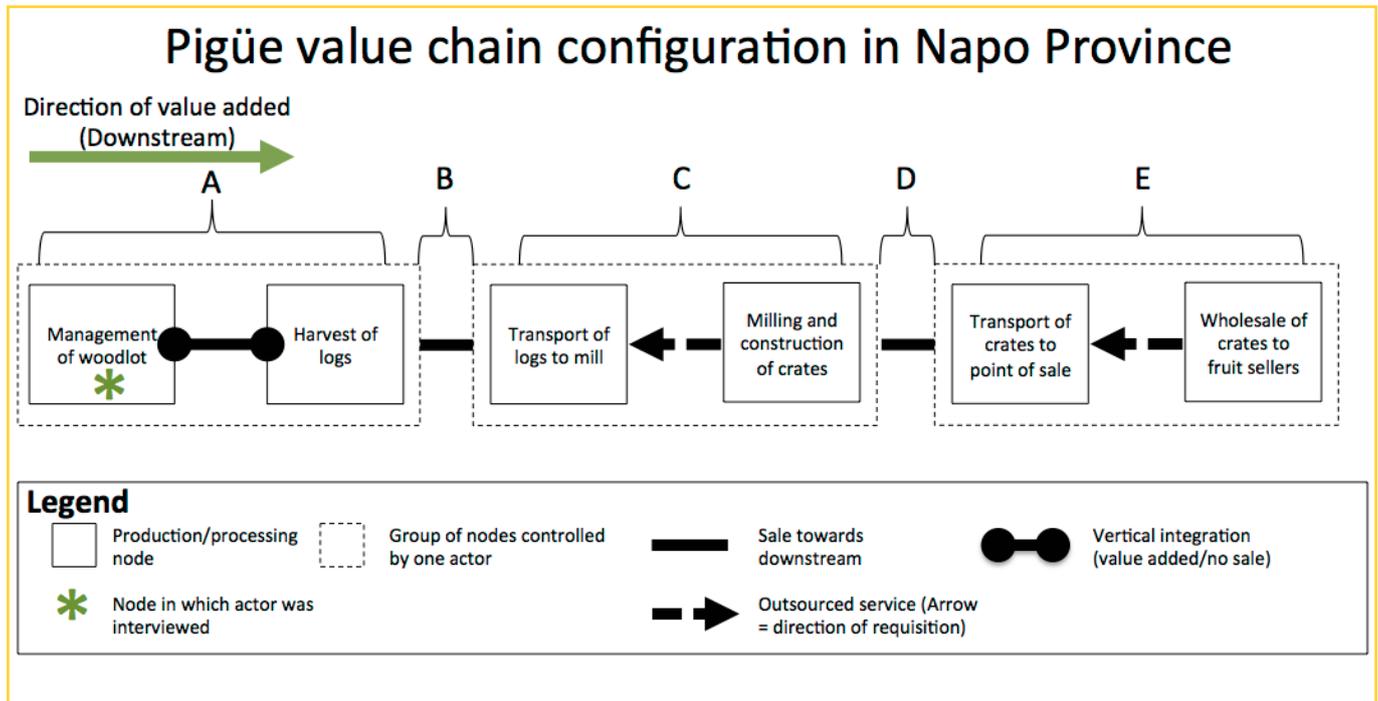


Figure 3. Example of a typical configuration of the value chain for pigüe fruit crates in the study region. Farmers manage the trees in their fallows (or woodlot), harvest logs (A; timber management, harvesting) and sell them (B) to a sawmill that contracts the transport, mills the logs into lumber and constructs the crates (C). Fruit sellers buy the crates (D) and contract transport from the mill (E).

dispersal from these trees into cleared fallows and when saplings reach a height of ca. 2 m, minimal labor is devoted to liberation clearing and removal of vines.

Distance to the point of sale is a limiting factor in the marketing of pigüe due to the comparatively low value of the logs. It is only economical for producers with farms near main roads (maximum distance 500–1500 m) to commit the time and labor to haul the wood from their lands for sale on the roadside.

The decision regarding when to harvest and sell logs depends on household economic needs, including health emergencies or special events requiring cash as well as fluctuations in the price of naranjilla, the agricultural crop. Between June and August naranjilla prices drop, but demand for fruit crates increases in the Andean region because many upland fruits come into season at that time. The start of the school year, when cash is needed for fees and supplies, also coincides with the low season for naranjilla.

At harvest time, producers generally select trees between 20 and 40 cm in diameter, which are large enough to mill but still small enough to easily fell and carry to the road. Logs of 1 m in length are stacked along the road in cubes and sold by the rough cubic meter. The typical (median) volume of a

harvest in our sample was 12 m³, and 80% reported harvests of 20 m³ or less.

While a few informants reported selling standing trees or hiring outside help, the majority harvested and hauled the logs to the road using family labor. In general, the costs of harvesting are borne by the producer; occasionally a sawmill will advance a sum (e.g. 50% of the price of the harvested logs) to cover harvest costs, but this is rare due to the risk of non-delivery.

Between 2008 and 2012, prices of pigüe logs increased from around US\$7.50–10.00 to around US\$9.00–15.00. If capital (a chainsaw and sometimes mules for transport) and free family labor are available, log production costs can be as low as US\$ 1.50 per m³. However, if this free labor and capital are not available, it can become unprofitable to harvest with costs potentially reaching up to an estimated US\$12.00 per m³ (Table 1).

While average rural incomes in Napo, Ecuador, are estimated at around US\$455 per month (INEC 2012) interviews with key informants estimated the monthly incomes in the study area to be around US\$200. Based on that estimate, in the month of harvest a typical producer family can earn an extra two-thirds of their monthly income from pigüe (see Table 1 for details).

Table 1. Estimated profits accruing to families producing pigüe for local mills. By selling the equivalent of 12 m³ of standing trees a family can earn \$72 dollars (Example 1). Most families interviewed (n=20) had a chainsaw and harvested the wood themselves, thus earning \$126. With increased reliance on external inputs of capital, profits decrease (Example 3) and if free family labor is completely unavailable, it is unlikely that harvest and sale of pigüe will bring a cash profit to the family (Example 4). We encountered only one such case. However, if a landholder chooses to hire help, one potential benefit is that the land would be cleared for the next agricultural planting; additionally, those earning the income may be part of a social network that benefits collectively from regular economic interactions.

	Sale of standing trees	Sale of logs		
	Example 1: Sale of standing trees	Example 2: Family harvests trees with own labor and chainsaw	Example 3: Family harvests trees with own labor with rented chainsaw	Example 4: Contracts labor and chainsaw to harvest trees
Price in m ³ (US\$)	6.00	12.00	12.00	12.00
Costs per m ³ (US\$)				
Labor	0.00	0.00	0.00	8.50
Chainsaw rental	0.00	0.00	2.00	2.00
Fuel and maintenance	0.00	1.50	1.50	1.50
Profit per m ³ (US\$)	6.00	10.50	8.50	0.00
Total profit per 12m ³ harvest (US\$)	72.00	126.00	102.00	0.00



Figure 4. Photos of pigüe processing. Top: milling with hand-operated equipment. Bottom: assembled fruit crates

Downstream processing and marketing of pigüe crates and pallets by small sawmills

The 10 small mills in the study area are specialized in the production of pigüe boxes and pallets. Due to increased demand, five of the mills had opened in the past 5 years. The mills are situated along roads near settlements and close (≤ 30 km) to the production areas so as to reduce transport costs and to minimize the chances of confiscation by forestry officials during movements of the logs. The minimum load carried to mills is 6 m³, the capacity of a small truck. Operations are low-tech, featuring hand-operated tools such as a stationary engine, a couple of circular table saws, and various other tools. Four to eight workers operate a mill, including a master *tablillero* (saw operator producing

tablillas, or boards) and 2–3 assistants and 1–4 *clavadores* (“nailers”) to assemble crates and pallets (Figure 3). Other actors involved may include an owner/administrator and a cook who is often the wife of the owner.

Crates are mostly produced to transport locally produced naranjilla, but there is also a market for unassembled box kits. These are transported to the northern Andes region and assembled there to transport tomatoes and other fruits. Kits for pallets are sold to truckers, who in turn sell them in the coastal provinces. By-products of milling (sawdust and shavings) are sold to companies in Quito producing chipboard.

The market is competitive and prices vary depending on production of and demand for fruit in the Napo area and in the Andes. Mills work to order, and the main buyers are

naranjilla traders who distribute the boxes to growers at harvest time; these same traders are contracted by the mills to transport the logs from producer areas to the mills, and are therefore the main link between timber producers and processors in the value chain.

Inadequate policy environment to optimize profits to small producers and processors

The regulation of the pigüe market legally falls under a special provision of the SAF (*sistema de aprovechamiento forestal* or forestry management system). No forest management plan is needed, but the law requires an official permit regulating harvest and transport of logs. Under this system, the minimum diameter of logs is 30 cm and only 12 m³ can be transported in one load. In 2012, the SAF was modified to facilitate permitting, including the development of an online application. However, producers and farms need to be registered in advance, and this registration involves georeferencing and zoning of the production area and requires a legal land title. With this reform came increased control on the roads by the Ministry of Environment, and for a time market activity ceased because of fears that logs would be confiscated during transport.

Among the 30 producers interviewed, only 13 were aware of the permitting system. Of these, only one attested to having registered, with the help of a mill owner who covered the costs and administration of the process. One reason cited by six informants for non-compliance was that the system is too time-consuming and burdensome, requiring travel to the provincial capital, acquisition of a legal land title, and contracting technical assistance. Other reasons included expense and lack of knowledge of the procedures.

The estimated costs of complying with the SAF requirements include notarized documentation of land title (US\$35), fees to engage technical assistance for zoning of US\$150 to US\$300, depending on the size of the farm, and a US\$1 fee per 12 m³ of product transported from the site.

According to sawmill personnel, lack of producer registration limited supply during the time of the study. Of the communities supplying timber, the members of only one had completed the required paperwork. The processes of zoning and georeferencing production areas are costs that are too high for producers to bear given the sporadic nature of the market. Some mills had opted to sponsor permitting for at least one farm in order to obtain transport permits. The mills, meanwhile, attested to having their own permits registered in the system.

Combined with growing processing costs – the price of nails reportedly increased 140% and oil 250% from 2011 to 2012– sawmills need to pay municipal license fees and taxes.

The sum of these costs cuts into the profits of processors and makes the market less viable.

Conclusions and recommendations

The local value chain for pigüe crates and pallets in Napo province allows members of local communities to benefit from a low-value timber that regenerates naturally in agricultural fallows. Processing of this timber into useful products used in shipping of produce requires minimal equipment that is affordable to local people, and operation of small mills requires few skills and little labor. In recent years, there has been an increase in demand for pigüe products, and the number of small mills has increased.

However, though the SAF forestry management system has been streamlined and improved to facilitate small-scale timber production, costs of compliance are apparently high enough to discourage participation of producers in the value chain. With increasing costs, processors also appear to be operating on a narrowing profit margin. Due to these factors, the entire value chain can be assessed as vulnerable. Even without these factors, the maximum distances over which it is profitable for actors to participate suggest that the market is quite limited: farmers do not carry timber further than 1.5 km to transport routes, and mills do not source timber further than 30 km from their plant.

Based on the above-mentioned findings, the following policy recommendations can be drawn:

- Because pigüe timber is produced in agricultural fallows and is therefore part of a shifting cultivation system rather than a managed forest, less onerous regulation of its trade is necessary.
- In lands recognized as collective agricultural production areas, a land title, zoning, and georeferencing of pigüe production areas should not be required.
- As a component of the subsistence system of economically vulnerable people, the taxes and licensing associated with processing pigüe products could be reviewed and potentially reduced or eliminated as part of a poverty alleviation agenda.
- Through a rural assistance program, subsidies or microcredit for small inputs of capital to producers would support the pigüe value chain by allowing more families to use their own labor to harvest and transport logs to the nearest road accessed by buyers.
- Depending on how many small processors have economically viable operations in a given area, improvement of their processing technologies could be considered, and the use of pigüe by-products for other products (such as particle board) should be examined as a potential new opportunity.
- Additional research to identify other local value chains for sustainably produced timbers is needed.

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