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Timber production in smallholder agroforestry systems

Justifications for pro-poor forest policy in Peru

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This document provides background and explanations for suggestions to modify the draft of the Regulations of the Forest and Wildlife Law (Law No. 29763). The new regulations offer possibilities to reduce the regulatory burden placed on smallholder farmers who produce and sell fast-growing timber in their farming systems. Reducing regulations on these relatively benign systems will also lower the burden on forestry agencies, allowing them to focus regulatory actions on old growth forests, threatened forest species, and other actors involved with these resources.

Forest policy and farming systems in the Peruvian Amazon

The recognition of the role of agroforestry in timber production in Peru's 2011 forest law (No. 29763) is a major step towards supporting smallholder forestry. Formal recognition of and support for smallholders to produce

timber in their farming systems has potentially broad, long-term impacts for both local livelihoods and the provision of ecosystem services. The next step will be to ensure that recognition of smallholder timber production systems is reflected in the regulations and accompanying norms and that the processes and arrangements created through these regulations produce a conducive environment for these systems, allowing smallholders to participate formally and benefit equitably in the forest sector.

A positive step in the new law is that it recognizes the multiple forestry practices used by smallholders for managing and producing trees in their landholdings. The opportunities opened by the new law could encourage smallholder farmers to sustainably manage timber on their farmland. However, the draft regulations also present potential obstacles to formal engagement in the sector, and thus present a risk of over-regulation and

onerous, expensive procedures for harvest and transport that might hinder the spirit of the legislation itself. Over-regulation could continue to drive smallholders into the informal sector both for timber and other forest products. The negative consequences for smallholder producers would remain, i.e., low prices and probable legal sanction or economic losses if discovered. For the State, such an outcome would jeopardize the success of policies intended to promote sustainable natural resources management.

Agroforestry: Systems and land use practices that entail the combined management of forest species with agricultural crops in the same plot spatially and temporally. It includes practices that integrate, preserve and manage perennial woody species in productive systems of annual or perennial agricultural crops, either in orderly plantations, or in traditional systems where natural regeneration is managed as secondary successional growth (known as *purmas* in the Peruvian Amazon).

A strong identity for smallholder forestry and landscape management practices is crucial to delineate strategic pathways to achieve long-term provision of ecosystem services and food security as strategies for sustainable adaptation to socio-environmental changes. Agroforestry appears as a common thread to support and link initiatives to reduce poverty, curb deforestation and CO₂ emissions, and mitigate and adapt to climate change (Porro et al. 2012). This brief is intended to serve as background and justification for our specific recommendations to revise the draft regulations of the new forestry law No. 29763 so that they reflect the needs and realities of smallholder farmers.

Smallholder timber management

Smallholder farmers in Amazonia play an important role producing timber in their farm systems, in particular in supplying local and national markets with construction material for low-cost housing. Acknowledgement by the Peruvian government of smallholder forestry systems in its regulatory framework could shift the paradigm in the forest sector in Amazonia from extraction to production, and it would improve rural livelihoods and maintain forest ecosystem services.

In the Peruvian Amazon, smallholder farm systems comprise a mosaic of interconnected production units (Padoch &

Pinedo-Vasquez, 2006), including homegardens, swidden fields, fruit orchards, fallows, and forest patches (Coomes, 1992; de Jong, 2001; Denevan, 1984; Denevan & Padoch, 1987; Hiraoka, 1989). They may also include conventional multistrata agroforestry plots, such as with cacao and coffee. Over space and through time, in the same land management unit, these farmers produce a diversity of annual and perennial crops in a system that integrates natural ecological processes with agricultural, silvicultural, and livestock management practices. This can be considered broadly as a traditional agroforestry system (Sinclair, 1999). The management of trees within a farm system is part of an integrated approach to land use typical of Amazonian smallholders, and which should be recognized by the Peruvian government for its value as a silvicultural system.

Traditional fallow-based agroforestry is ubiquitous in the Peruvian Amazon

A preliminary analysis of over 376 Amazonian districts surveyed during Peru's most recent agricultural census (CENAGRO 2012) shows more than 4.5 million hectares of land under smallholder production mosaics (agroforestry). Land under fallow (defined in the census as "*barbecho*" or "*no-trabajado*"), corresponds to more than 19% of the surface area, and about 45% of the producers hold some fallow units. Mature secondary forest and forest remnants ("*Montes y Bosques*" of unspecified origin, which might be secondary forest or old growth forest) cover 44% of the mosaic and are found in 42% of smallholder landholdings. Planned and organized agroforestry systems based on permanent tree crop plantations are reported as a relatively minor element (16%) of the landholdings, as well as timber plantations (0.2%), although these land-uses are in rapid expansion in some Amazonian regions.

Smallholder forestry facilitates the production, management and conservation of multiple resources (e.g., timber, game, medicinal plants) and multiple ecosystem services (e.g., soil fertility, biodiversity) (Padoch et al., 1985; Padoch & Pinedo-Vasquez, 1996; Pattanayak & Sills, 2001; Pinedo-Vasquez et al., 1992; Pyhala et al., 2007) (see Table 1). The agricultural fallow, or *purma* in Peru, is a dynamic component of production mosaic landscapes, and it presents an ideal niche for short-cycle timber production. Under these systems, smallholders facilitate the growth of timber species in their fields by managing natural regeneration of fast-growing timber

species, as well as enriching their fields with desirable timber and non-timber species, including fruit species that attract wildlife, among them game animals.

We estimate that a majority of smallholder farmers in the Peruvian Amazon maintains some important wood species and stocks of commercial timber on their landholdings, including in forest patches. For example, land surveys conducted in a sample of 21 landholdings in the Amazon town of Contamana revealed that most farmers had more than one fallow, and the average size was 6.0 ha. Among the most dominant fast-growing timber species found were *bolaina* (*Guazuma crinita*, Sterculiaceae) and *capirona* (*Calycophyllum spruceanum*, Rubiaceae). *Bolaina* was found in 38 of the 39 fallows and in 18 of 23 fields, while *capirona* was found in 20 fallows.

Amazonian farmers employ a range of silvicultural and soil management practices in their fallows. These secondary forest stands can have different structures, compositions, and functions, depending on the landholder's

management objectives, practices, and natural factors, such as the availability of seeds (Pinedo-Vasquez & Sears, 2011). Some fallows are managed intensively to optimize timber production while in others farmers integrate timber and fruit in a more species-diverse and complex system (Fig. 1). In the landholdings where forest inventories were conducted, thirteen commercial timber species, five fruit tree species, and six other useful tree species were found. Other fallows are only lightly managed, where the primary objective is soil recuperation and provision of other ecological services. In these systems, silvicultural practices are typically employed, such as thinning, pruning and clearing understory.

In these complex systems, farmers rely on transitional ecological processes between field and forest. Timber management in fallows begins in the agricultural field, usually with the appearance of natural regeneration of fast-growing timber species retained in the final year of the annual cropping cycle. Intensively managed fallows may be dominated by a single species, such as



Figure 1. These photos show the variability in timber production systems of smallholder farmers, ranging from low to high intensity of management. A. Low intensity management of natural regeneration of *bolaina* and other timber species in a fallow. B. Management of natural regeneration of over-exploited timber species with fruit trees. C. Agroforestry system combining cacao with *bolaina*. D. *Bolaina* plantation (photos A, B, C by Robin Sears; photo D by Peter Cronkleton).

bolaina or *capirona*, and with a clear understory, giving the appearance of plantations to stands in reality established through management of natural regeneration.

Studies of *bolaina* in fallows reveal that the size distribution and average number of *bolaina* trees per hectare varies among households, reflecting multiple factors, including age and management intensity in the fallow areas. A well-stocked fallow can have from 200 to 300 mature *bolaina* trees (20 cm DBH) per hectare. *Bolaina* can grow at a rate of 4.5 cm diameter per year, but averages 3-4 cm (Current et al., 1998). Thus, farmers can produce poles (>5 cm DBH) in one to two years and trees of 19-25 cm DBH in four to six years, depending on soil conditions. *Capirona* grows more slowly, at an average rate of 1.5 cm in diameter per year in managed fallows and 1.8 to 5.2 cm diameter in the first year of a plantation, but the wood is of higher quality and therefore value. Smallholders tend to harvest pole trees of *capirona* for construction (5-9 cm DBH) in three to five years, and small-diameter saw timber (15-20 cm DBH) in eleven to twelve years. Poles and small-diameter timber of both species are highly marketable in the local and regional markets in the Peruvian Amazon.

Table 1. Ecosystem goods and services of fallow forests in agroforestry systems.

Ecological Functions	Productive Functions
Recovery of soil fertility	Fruit and vegetable production
Regulation of pests and disease	Source of protein (terrestrial or aquatic animals)
Regulation of light, humidity and temperature	Medicinal plants and other non-timber products
Diversification of habitats, wildlife refuge	Fuel wood production
Seed source	Timber production, subsistence
Flood mitigation	Timber production, commercial

Farmers also enrich their fields by planting seeds or seedlings of high-value, slow-growing timber species, particularly cedar (*Cedrela odorata*, Meliaceae), mahogany (*Swietenia macrophylla*, Meliaceae), and *shihuahuaco* (*Dipteryx* spp., Fabaceae), among others. This enrichment increases the ecological and commercial value of the landholding (Montagnini & Mendelsohn, 1997; Putzel et al., 2013a) and provides income from the sale of individual or small numbers of these high-value timber trees. Through planting and management of natural regeneration in their field systems as well as in surrounding areas of disturbed post-logged forest, smallholder farmers are conserving the

valuable germplasm of increasingly scarce timber species (Putzel et al., 2013a). This process of enrichment is a viable alternative to state-sponsored reforestation programs, particularly for restoring the populations of over-exploited timber species. Smallholder forest enrichment systems combine both economic gains (production of timber and fruits) and ecological benefits (restoration of the regenerative capacity of populations of depleted valuable timber species).

Socioeconomic and demographic justification for the deregulation of fast-growing timber

In an effort to improve rural livelihoods, state and non-governmental agents have developed initiatives to create markets for non-timber forest products in Amazonia, although these externally-driven initiatives have largely been unsuccessful (Schmink, 2004; Medina et al., 2009; Pokorny & Johnson, 2008). Likewise, agriculture and forestry extension agencies have invested in species and system improvement projects to promote higher and consistent quality of product (e.g., d'Oliveira, 1992; Weber et al., 2000), or in promoting community forest management for more equitable distribution of benefits to rural landholders (Antinori & Barton Bray, 2005; Barton Bray, 2004; Smith & Scherr, 2002), but with little lasting benefit beyond a few exceptional pilot cases. Little work has been done to evaluate and support the endogenous practices and approaches rural people employ to manage and produce forest products on their own. Forestry is one of many activities and livelihood options that sustain households of many rural populations in the Peruvian Amazon. The production of fast-growing timber by rural smallholder farmers in Amazonia is an endogenous and flexible economic activity that is currently a key source of income for many Amazonians. A recent market boom in Peru for fast-growing timber species has stimulated many Amazonian smallholders to produce timber on their landholdings. Similar to small, private forestry in Europe and the United States, the smallholder farmer in Amazonia has become an important producer of timber for domestic markets.

For rural Amazonian populations, a farm with timber and livestock is like a bank account. When a financial need arises, they will harvest and sell trees, or sell livestock, but will otherwise maintain them as savings for the future. The timber volume harvested reflects the magnitude of their financial need, usually ranging from fifty to several hundred trees. Landowners commercialize their fallow

timber in several ways, according to their knowledge of the market, skill and capacity in felling and transforming the timber, and access to physical and financial capital. They may (i) sell the standing trees; (ii) fell the trees, cut logs to size, and sell these logs (*tucos*) to a buyer at their farm gate or at a market; or (iii) contract a mobile sawmill operator to transform the logs to small-dimension lumber (*tablillas*) in situ. Their profit margin increases dramatically as they add value to the product, but this requires capital inputs. Selling stumpage (trees) on the landholding can earn a farmer approximately US\$480 per hectare, while producing and selling small dimension lumber (*tablillas*) can earn the owner approximately US\$1800 per hectare (Putzel et al. 2013b).

Several factors make the production of fast-growing timber in fallows a viable economic activity for rural Amazonian farmers. First, timber is already integrated into their land use systems, so farmers can respond rapidly to market changes. The harvest cycle for these species is short: 5-6 years for *bolaina*, 6-12 years for *capirona*. If they maintain several fallows of different ages, farmers can be guaranteed income every one to two years. Second, for small-diameter timber sold in small quantities, there is less opportunity for buyers to cheat the producer out of a fair price. Third, investments in labor and machinery to produce, harvest, process and transport these products are low, since the wood is of small dimension and is relatively lightweight. All of these factors lower the investment risks for the producer.

The fast-growing species that occur in the Amazon are suitable for production of small-dimension lumber, the *tablilla*. This lumber is in high demand by low-income residents throughout Peru. A rapid survey of wood markets in the Lima metropolitan area identified almost 240 small businesses selling *bolaina* products in just four districts visited. The number of vendors of this type of timber has increased rapidly in recent years. It was observed that a single *tablilla* buyer in Pucallpa reported sending 21 truckloads (equal to a volume of 1029 m³ total)¹ per month of *bolaina tablillas* to Lima, with little variation over the year. The increase in production of the low-cost lumber by Amazonian smallholders is a response to a process of rapid urbanization in municipal and urban centers in the Peruvian Amazon: in 2007

almost half of residents in Pucallpa lived in shanty towns (*asentamientos humanos*), and 65 per cent of those lived in houses constructed of *bolaina*, among other local species (Padoch et al., 2008).

Timber production in smallholder mosaic landscapes could lead to significant improvements in the rural livelihoods of approximately 450,000 smallholder farm families living in the Peruvian Amazon (CENAGRO Census 2012). Timber production in these systems also can alleviate pressure on timber resources in the natural forest, at least for those species produced in the fallow system. Thus, by supporting smallholder farming, and the integration of timber production in their systems, the socio-environmental benefits of strengthening food security are coupled with sustainable resource use. Smallholder forestry can help Peru make the transition from relying solely on extractive logging to sustainable and productive forestry. However, the lack of understanding of the impact of regulatory mechanisms and forestry policies on smallholders, and indeed on the forests, remains an obstacle to the equitable engagement of smallholders in the timber sector. The production, processing and trade of timber and non-timber products by smallholder farmers could be supported by a policy and regulatory environment based in secure land and resource tenure, fair and just forest and timber regulatory mechanisms, and accountability in the timber value chain.

While today most smallholder farmers who have access to markets for timber are managing fast-growing and some high-value timber species on their landholdings few are legally protected to harvest, process, and sell their timber and non-timber resources. Without secure resource tenure, or a mechanism for securing rights to harvest the timber they produce, landholders who do commercialize their timber must do so through informal, and risky, means. The current regulatory framework is not adapted to the realities faced by smallholders, nor does it facilitate the change from extractive to productive forestry practices. The current policy is rather designed primarily for the extraction of hardwoods from mature forests by medium and large scale enterprises. Furthermore, even if they have land title, the costs of compliance for smallholders, both in terms of financial resources and time, are prohibitive and represent significant obstacles and constraints, forcing them to rely on intermediaries or to take on substantial

1 Each truckload contains 15,000 *tablillas*. The volume carried per truckload varies from 49-50 cubic meters.

risk of sanction or financial loss. The three greatest risks for smallholder producers who sell timber informally in this sector are:

- (i) Sanctions by agents of the state for illegal sale of timber,
- (ii) Loss of income due to inequitable transactions between producer and buyer, and
- (iii) Theft of timber from the landholding.

To lower these risks, and to provide more security in their production and sale of timber, it is recommended that the State creates simple and clear procedures for smallholders to register their timber production systems, allowing them to harvest, transform, and transport roundwood or lumber. It is in the interest of the Peruvian state to encourage and facilitate small-scale timber producers because their timber production systems are both environmentally sustainable and adapted to local conditions. Establishing a reasonably simple and secure process for legal sale of fast-growing timber species from small landholdings can improve the income and wealth of a great proportion of rural households in Amazonia.

New forestry regulations that support the production of timber in smallholder agroforestry systems offer some possibility for fixing this problem. Our proposal is to minimize the regulatory burden on smallholder farmers who produce and sell fast-growing timber in agroforestry systems. In addition, the proposed revisions will lower the burden on forestry officials, allowing them to focus regulatory actions on the larger-scale extractive and potentially destructive practices and practitioners whose regulation is the primary purpose of the law.

Recommendations for pro-poor forestry in Peru

Our recommendations, based on more than a decade of cumulative field and market research in this sector, is to lighten the regulatory burden on smallholders for the production and commercialization of fast-growing species produced in their mosaic production systems. A call for the deregulation of smallholder timber is not unprecedented (Fay & Michon, 2003; ICRAF, 2001; Sunderlin et al., 2005), but it has rarely been implemented. At this moment there is a window of opportunity for Peru to formulate an innovative policy that would not only advance development and environmental sustainability

in the Peruvian Amazon but could also be a pioneering example across the region and globally.

To this end, we propose specific recommendations for creating a pro-poor regulatory environment that supports the production of timber in smallholder agroforestry systems. In a separate document we have provided specific modifications to the draft regulations of Peru's 2011 forestry law (No. 29763). We also suggest steps that can be taken by regional and district governments to support smallholders. Specifically, the regulations should:

1. Ensure that the regulations describe clearly and explicitly the practices and places where timber is produced in the mosaic production systems of smallholder Amazonian farmers.
2. Create and mandate the implementation of a simple and clear process for smallholder farmers to register their timber production systems in a national registry and allow them to obtain permission to harvest, transform, and transport the timber regardless of whether farmers have title or have gained rights to manage resources under *"cesión en uso"* presented in the new forest law.
3. Establish a process and define government support for an office in the appropriate state agencies of local and regional governments to implement the registry and monitoring systems. The role of this agency should be to provide technical and informational support to small-scale timber producers.
4. Establish simple and accessible rules for harvest and transformation of timber produced by smallholder farmers in agroforestry systems that facilitate their participation in the market and protect their rights. The minimum diameter requirement for fast-growing timber species produced in agroforestry systems of smallholders should be modified.

Adoption of these recommendations should serve to shift the paradigm of forestry in Amazonia from timber extraction to production and recognize and support the important role smallholders play in the Peruvian forestry sector. The outcome of this initiative would be the strengthening of Peru's regulatory bodies and processes to promote and support the sustainable production of timber in rural farms while improving rural livelihoods and increasing forest cover.

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