



## On-farm timber production for emission reduction with sustainable benefits at the tropical forest margins

On-farm trees in West and Central Africa are increasingly recognized as an important source of timber with tremendous opportunities for enhancing livelihoods, biodiversity conservation, contributing to reducing forest degradation and other functions. This policy brief highlights key findings and issues from research in Cameroon and Ghana - especially as it relates to REDD+ and sustainable land management.

### Key findings

#### 1. Smallholders' mixed agricultural mosaic hosts a significant amount of timber trees.

Traditional smallholders' practice of preserving multi-purpose forest trees on-farms has produced rural land rich in timber resources.

#### 2. Smallholder production systems hold a significant share of the national timber production.

In timber producing countries like Ghana and Cameroon, on-farm timber is largely harvested to supply the domestic and export market.

#### 3. Smallholders do not benefit from on-farm timber harvesting

Trees are perceived as a resource in transition, whose future is not to be secured.

#### 4. Farm-grown timber has potential for reducing forest degradation and enhancing carbon stocks, thereby contributing to NAMAs

The ecological benefits of on-farm timber production consist not only in diverting part of the logging from the forest, but also in mitigating the effects of forest loss due to agricultural expansion.

### Implications

- An assessment of the importance of non-forest timber production and its potential is needed in order to define sustainable timber resources management strategies.
- Particular attention should be paid to the link between smallholder agriculture and opportunities to associate timber with agricultural production.
- Policies and incentive systems are needed for enhancing sustainable on-farm timber production.
- Tree-based farming systems need to be encouraged as part of a low-carbon emissions development pathway and adaptation strategy.

## Trees on farm: a traditional strategy to enhance system resilience and meet household contingencies

Indigenous multi-purpose forest trees have been a key element in traditional smallholder natural resource management strategies at the tropical forest margins in West and Central Africa. Farmers maintain selected forest species on their farms to:

1. increase crop productivity (through enhancement of soil fertility, of nutrient cycling, management of light and moisture, protection from wind);
2. provide valuable products (food, medicines, construction timber, fuel wood etc.) for household consumption and income diversification.

A wealth of local knowledge was developed on the use of trees in the management of the spatio-temporal farm-forest continuum in swidden and agroforest systems. The extension of the timber market to rural areas coupled with agricultural expansion and technology spread has progressively eliminated tree resources from the agricultural mosaic in Ghana and has an increasing impact in some regions of Cameroon (Figure 2 and 3).

### Smallholders' farmland hosts a significant amount of timber trees

On-farm timber tree density varies with land use systems. In Cameroon, estimates based on National Forest Inventory data indicate that about 27.6 million m<sup>3</sup> and 33.1 million m<sup>3</sup> of exploitable timber are found on perennial cropland and on fallow land respectively. Overall volume densities are higher in the fallow based systems than in the perennial crops (Table 1). However in the most intensively cultivated areas the highest volumes are preserved in cocoa agroforests. In Ghana, cocoa farms, food crop farms and fallow land contain more timber trees than the remaining natural forest outside forest reserves.

Between 1996 and 2005, despite attempts by the Forestry Commission to regulate off-reserve harvesting, the total tree standing volume decreased from 95 million m<sup>3</sup> to 37 million m<sup>3</sup>.

LAND USE	Frake	Ayous	Dabema	Tali	Sapelli	Iroko
Permanent tree crops	3.3	3.0	3.9	0.5	1.9	1.9
Annual crops	1.8	ns	0.1	0.3	5.3	0.3
Young fallows	4.2	2.2	1.3	1.0	ns	2.1
Medium fallows	7.8	8.4	6.1	5.5	1.9	1.6

**Table 1:** Exploitable V/ha of the most important species calculated over a sampling area of 162 ha (FAO-MINFOF 2007)



**Figure 2:** Intensified cocoa landscape bordering the Bia Reserve in South West Ghana. Photo by V. Robiglio.

### Farmland timber stock plays a key role in national timber production

In Cameroon and Ghana small-scale logging practiced on farmland contributes to 50% of the national timber production. Most of the timber exploited on rural lands in Cameroon belongs to a handful of species, in particular *Triplochiton scleroxylon* (Ayous), and is harvested in fallow units. Outside the reserves of Ghana, cocoa farms are the second most important source of timber behind natural forests. Awareness is increasing about the socio-economic importance of small-scale logging in terms of local employment and poverty reduction. In Cameroon, it generates about 45,000 direct jobs. The larger beneficiaries are local operators and urban timber traders who benefit from the accessibility of on-farm timber resources and of the low fees paid to farmers.

### Main barriers for on farm timber production

A series of assessments conducted under the REALU project in the villages of Central Cameroon, the region that supplies 80% of timber to the domestic market, identified key issues that limit on-farm timber production: (1) low economical value of timber trees relative to the waiting period to harvest the trees, (2) natural regeneration of forest trees in agricultural land, (3) the risks of pests and predators for the main crop, (4) the cost of raising timber trees in terms of crop area loss, (5) the weak position of smallholders in regards to forest authorities and logging operators. Similar factors were found for Ghana, where additional factors, such as low ownership and control over timber resources, as well as yield reduction and damages to main crops during exploitation hinder on-farm timber production. Smallholder farmers are excluded from the timber sector, and are not aware of the value of timber at the domestic and international markets. Also, they do not see timber production as a livelihood option.

### Farmland timber production has potential for reducing forest degradation, landscape restoration ...

Forest trees on farmland play an important role in the conservation of forest resources. They function as seed sources, feeding and perching sites for dispersing birds and small vertebrates and provide favorable conditions of light, moisture and nutrients for establishment of regeneration. They enhance

connectivity and conduit functions of forest species across the agricultural matrix .

Small-scale logging of on-farm timber has a lower environmental impact than industrial logging. The advantages include: (1) chainsaw processing is as efficient as industrial processing; (2) it exploits almost all tree parts; (3) has a low impact on the felling site and (4) diverts logging from forest stands. However, coupled with agricultural expansion, small-scale on-farmland timber logging compromises the turnover of forest species in the natural fallow units, reducing fallow capacity to provide socio-economic and environmental services to smallholders. Such degradation of the agricultural matrix exacerbates degradation in forest remnants by intensifying margin and isolation effects.

### ... while enhancing carbon storage

Timber trees contribute to carbon stock and sequestration in the fallows and agroforests. In the high-shade systems of Southern Cameroon, carbon stocks from timber trees account for about 1/3 of the carbon stored. The shift towards sun-loving cocoa hybrids with the removal of trees entails carbon loss and significantly reduces the system carbon sequestration potential.



**Figure 3:** The agricultural mosaic in Central Cameroon. In the background is a cocoa farm. Photo by V. Robiglio.

### Are cocoa agroforests and fallows eligible for REDD+ ?

So far, forest definitions proposed by Cameroon and Ghana, with thresholds of 30% and 15% of potential tree crown cover respectively, make most of the smallholders' agricultural systems eligible for carbon enhancement intervention. REDD+ incentives could offset lower yields, improve timber sector regulation and promote fair benefit sharing in farmland timber production.

### Ghana, a long term focus on timber trees outside forest

Contrary to Cameroon, in Ghana the need to manage timber trees outside forest has for a long time been recognized. Past and present initiatives have attempted to promote the sustainable use of timber resources, defining exploitation parameters and combining timber with agricultural production.

The **Modified Taungya System**, a reforestation program that started in 2002 and is promoted by the Forestry Commission, is considered as a promising system to meet future demands for timber and increase food security. It combines food, fuelwood and timber production and is based on a scheme of short term payback periods on the share of timber sales.

#### Timber in the cocoa landscape

The Sustainable Tree Crops Program (STCP) at the International Institute for Tropical Agriculture (IITA), is training farmers on how to plant compatible timber and other fruit trees in cocoa farms in Cameroon, Côte d'Ivoire, Ghana, Liberia and Nigeria. The training involves improving skills through the use of research recommended good agricultural practices and educating farmers on the forestry policies *vis-a-vis* agroforestry activities. In Ghana, selected cocoa farmers trained in Ashanti, Eastern, Central, Brong-Ahafo and the Western Regions have so far planted over 595,911 seedlings of *Terminalia ivorensis* and *T. superba* in cocoa farms. This figure equates to 33,106 ha of trees planted in cocoa farms.



**Figure 4:** A farmer admiring his planted *Terminalia superba* on his new cocoa farm. Photo by Richard Asare.

## The way forward

REDD+ incentives can offset lower crop yields, sustain appropriate regulation in the timber sector and promote fair benefit sharing in farmland timber production. Measures to reduce forest degradation and enhance carbon sequestration can complement on-going efforts in timber regulation under the FLEGT-VPA\* agreements, as part of land-based Nationally Appropriate Mitigation Actions (NAMAs) and national adaptation strategies.

- In forest rich countries, a regulation for harvesting farmland timber is needed to secure supply from the rural mosaic and divert the pressure of small-scale logging from the forest, thus reducing forest degradation. However, efforts should be made to avoid the depletion of tree resources in the agricultural matrix by planting indigenous timber species adapted to farmland conditions. Promoting an efficient management of trees on farms results in carbon enhancement, income diversification and enhancement of system resilience to climate change.
- To overcome existing barriers to timber production, the system has to be integrated in the design of agricultural intensification options. Main barriers such as lack of rights and delayed benefits to farmers should be addressed with benefit sharing mechanisms that favor short term payback and market information systems on domestic and international timber prices, to increase farmers' awareness of timber value. In the long term, reforms to reinforce tree ownership by farmers, and control over timber resources

are needed. In forest poor countries that no longer have significant areas of forest at risk of illegal logging, the opportunity of deregulating on-farm timber should be assessed.

- There is potential for indigenous timber species to be associated with smallholder crop production. Natural regeneration should be integrated by domestication and planting with the development of related technical protocols. Farmers' knowledge about tree management and tree properties should be complemented with technical knowledge on crop-trees complementation. Adapted management units should be identified and inventory and monitoring systems developed.

Any measure to harness on-farm timber production through incentives, policy reform and regulation of the logging and agricultural sectors must support sustainable management of national forest resources but also mitigation and adaptation strategies.



**Figure 5: Artisanal Ayous beams in transit to Yaounde, Cameroon.**

Photo by V. Robiglio.

\* FLEGT-VPA is the Voluntary Partnership Agreement (VPA) on Forest Law Enforcement, Governance and Trade (FLEGT).

The ASB Partnership for the Tropical Forest Margins is working to raise productivity and income of rural households in the humid tropics without increasing deforestation or undermining essential environmental services.

ASB is a consortium of over 90 international and national-level partners with an ecoregional focus on the forest-agriculture margins in the humid tropics. The partners have established 12 benchmark sites in the tropical forest biome of Brazil, Cameroon, Indonesia, Peru, Philippines and Vietnam.

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