



3.3 Sustainable management of guadua bamboo forest, Colombia

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Introduction: the coffee region of Colombia

The coffee region of Colombia encompasses an approximate area of 5.8 million ha between 900 and 2000 metres above sea level. The bamboo species *Guadua angustifolia* Kunth (guadua) provides almost the only existing forest cover. Therefore, its protection, conservation and sustainable management are a government priority. These forests provide raw material for different products and also generate income for farmers and other stakeholders in the coffee production chain. For the forest sector and institutions in charge of environmental management and control at the regional level, the *Corporación Autónoma Regional* (CAR), conservation and effective management of the guadua forest is a challenge. Illegal harvesting leading to forest degradation requires governance in the form of flexible and effective instruments of control and forestry development; technical assistance; access to forest extension programmes and information for development and marketing. Recently, illegality has decreased and guadua farmers are better able to sustainably manage their forest and improve their livelihoods.



IMPROVEMENTS ACHIEVED
IN GUADUA FOREST
HARVESTING MIGHT ALSO
HAVE A POSITIVE IMPACT
ON CHAINSAW MILLING ACTIVITIES.

Guadua bamboo forests in Colombia

Guadua is a woody bamboo. It is an important natural resource in Colombia, particularly in the coffee region. Traditionally, farmers used guadua to build products such as houses, furniture, handicrafts, veneers and flooring. In the last guadua inventory, the total area in the coffee region was estimated at 28,000 ha (Kleinn and Morales 2006), most of it in natural stands.

In the coffee region, timber used for domestic and commercial applications originates mainly from natural forests located along the Pacific coast. Most of the forests were eliminated a long time ago, largely replaced by agriculture. Small fragments of forest dominated by guadua are the remnants of natural forest in the area.

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Guadua forests are highly fragmented and most patches are smaller than five ha (Camargo and Cardona 2005). However, these forests are an important refuge of biodiversity where more than 400 woody species have been identified. They also provide habitat for about 50 birds species and 18 mammals (bats), which fulfill important ecological functions (CIEBREG 2008).

Because of the nature of guadua culms,¹ logging and processing is usually conducted using a machete, although recently chainsaws have been used in some places. Harvesting of guadua forest consists of the extraction of a fraction of mature culms. A significant number of standing culms with different stages of maturity remain in the forest if it is effectively managed (the density is on average 6,500 culms per ha). Further fragmentation of these forests has implications for silviculture, because larger areas of guadua stands would be required to meet demands. A number of farmers, wishing to avoid the costs of forest planning and technical assistance, are not managing the small guadua areas properly. Although most of the culms harvested are used for domestic applications and harvesting intensity is usually low, the silvicultural practices to obtain them are unsustainable.



Unsustainable domestic harvesting sometimes causes environmental damage and increases the susceptibility of guadua stands to wind and rainstorms and to decreased productivity and quality. Higher profits would be obtained if an effective technical process for harvesting were applied.

Guadua is the most highly harvested species, and provides wood for a variety of uses. Some reports show that between 2000 and 2004 roughly 2,420,000 culms of guadua were logged from 2,557 ha (Moreno 2006a). This means that about 90% of guadua stands were not harvested during that time. Guadua bamboo forests have been significant in supplying and sustaining small and medium enterprises (Held 2005) and have improved the likelihood of reaching European markets (Becker 2004). Unfortunately, data related to guadua harvesting have not been registered since 2004. According to the number of harvesting permissions requested and the number of guadua poles sold in timber stores, it is apparent that commercial use continues to be high.

When harvesting, a portion of mature and over-mature guadua culms are cut, then each is divided, usually in four pieces, according to intended use:

- *cepa* is the base of the culm, approximately the first three metres (m) of height, and is mainly used for domestic purposes such as fencing;
- *basa* is the next piece (about three to nine m of height), which has a higher commercial value and therefore is utilized for different purposes;
- *sobre basa* is the next piece (about nine to 15 m of height), which is usually manually flattened for making mats or *esterilla*;

- *puntal* is the last part of the culm — it is also used domestically, especially to support crops such as plantain, banana and tomato.

The most valuable product, *basa*, is traded by owners of farms or small companies that process and sell guadua poles; other products provide additional income for workers in charge of the harvest (*guadueros*). The use and sale of these products fulfill an important social role, equivalent to that of chainsaw milling in other kinds of forests.

Legal framework

Harvesting culms in guadua forest and processing them into low-quality products, such as *esterilla*, *cepa* and *puntal*, is permitted in Colombia, as long as these products are included in the harvesting volume authorized by the environmental authority. This compares to chainsaw milling in Colombia, which is permitted if products obtained by this technique are included in the volume permitted by the environmental authority.



Illegal logging

According to the World Bank (2006) illegal logging in Colombia provides up to 40% of total timber production. This means that about 1.5 million m³ of commercialized timber is illegal. Sufficient information is not available on illegal logging in the guadua forest, although institutions in charge of control reported that an important amount of guadua culms is illegally harvested and sold (Moreno 2006b). This is due to the difficulties in controlling the large number of small forest patches distributed throughout the coffee region; in addition, culms are used for domestic purposes in many cases.

The Bosques FLEGT/Colombia project, was formulated and led by the *Corporación Autónoma Regional de Risaralda* (CARDER). The project developed an index to estimate the extent of illegal guadua culms traded over a period of time. This index is based on the difference between the number of guadua culms transported and the number authorized by the CAR. The index is calculated based on infractions related to over-quota harvesting (Bosques FLEGT/Colombia 2010). The average percentage of illegally traded culms was estimated to be 29% in Risaralda, 37% in Quindío and 25% in Tolima State (Bosques/Flegt Colombia 2010).

Strategies for improving management and reducing illegal harvesting

A range of strategies has been developed to address the situation of guadua forests and promote its sustainable management. This process has been led by CARs through projects funded by GTZ (*Manejo Sostenible de Bosques en Colombia*) and the European Union (Bosques FLEGT/Colombia). The technological and scientific support of universities, particularly the Technological University of Pereira, has been essential. Research results have been the basis for the development of strategies.

Contribution from legislation

Since 2001 the CARs from the coffee region states (Caldas, Quindío, Risaralda, Tolima and Valle del Cauca) initiated activities in the framework of the *Manejo Sostenible de Bosques en Colombia* project to improve the forest management of guadua stands. One of the outcomes was a *Norma Unificada para el manejo de guaduales naturales* (NORM), which defined the guidelines for management within the framework of legislation. A terms of reference for the management and harvesting of guadua stands (TRMHGS) was also defined.

No precise specifications are described in the NORM or TRMHGS for each product obtained from guadua forest. The total volume authorized includes all products that can be harvested.

NORM and the TRMHGS aim to achieve the sustainable management of guadua stands. Stands that fulfill these requirements are registered as having sustainable management. In such cases, farmers receive incentives, reduction of taxes and technical assistance.

Planning of guadua forest

The *Manejo Sostenible de Bosques en Colombia* project carried on an assessment of land suitability and potential areas for establishing guadua plantations in the coffee region of Colombia. A total of 24 variables were used for analysis and to develop a model for land suitability. The variables were associated with five factors representing site conditions: topography, climate, soils, landscape ecology and socio-economics. By using a simple decision model based on the five factors, four classes of land capability were defined: low, marginal, moderate and high.

Only 2% of the total area evaluated had high capability for guadua production. These areas were located close to urban centres. The main limitation for guadua production was the lack of roads (for access) and markets. Areas over 2000 m in elevation were immediately excluded, because guadua does not grow well at that level.

Forest governance

The Bosques FLEGT/Colombia project also aimed to improve legality and governance so as to contribute to sustainable management and the improved productivity and commercialization of forest resources from small farmers. The project had several achievements:

- involvement of a range of stakeholders from the entire production chain in the development of forest management norms;
- optimization of the approval process for guadua forest harvesting;
- technical assistance to support legal forest management;
- voluntary forest management certification (FSC) for small farmers and elaboration of specific standards for guadua stands;
- articulation of the preventive, juridical, administrative and operational aspects of guadua forest management;
- cross-sector agreement for legal timber in Colombia;



- institutional coordination for strengthening forest control and alertness;
- increased market opportunities through improved technology and information;
- support for timber-processing enterprises; and
- establishment of forest management units.

Conclusions

Legislation, silvicultural practices and strategies of forest management have made a considerable contribution to improving the guadua sector in the coffee region of Colombia. The key issues for the development of the sector are consolidated in policies and through tools for better management of guadua stands. Stakeholders involved in each link of the production chain have been provided with tools, technical assistance, information on certification schemes and legislation. Although the situation has significantly improved, efforts now should focus on how to further develop market options.



Guadua forests have supplied products to timber markets in the coffee region of Colombia for several decades. Local people have benefitted from guadua production and sustained an active economic sector in this region, sometimes in conflict with other land uses such as coffee growing. This social impact is similar to that of chainsaw milling

which also has important social effects. Improvements achieved in Guadua forest harvesting might also have a positive impact on chainsaw milling activities. In order to guarantee sustainable development, we need to take an integrated approach to management that takes into account all aspects associated with the local production of guadua products or timber in the case of chainsaw milling.

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Endnote

1. Culm is the above-ground part of guadua that is harvested; it corresponds to the hollow jointed stem in rhizomes.

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