CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES
OF WILD FAUNA AND FLORA

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Dublin (Ireland), 22-30 March 2012

A DECADE OF BIGLEAF MAHOGANY (*SWIETENIA MACROPHYLLA* KING) MANAGEMENT, HARVEST AND EXPORT IN THE SICO-PAULAYA VALLEY, HONDURAS

The attached information document has been submitted by the United States of America at the request of Green Wood in relation to agenda items 14.1 and 19.1[*].

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A Decade of Bigleaf Mahogany (*Swietenia macrophylla* King) Management, Harvest and Export in the Sico-Paulaya Valley, Honduras

2000–2012

This document presents data obtained from more than ten years of experience in the production of mahogany guitar parts from communities in the Sico-Paulaya Valley, Honduras. The management, harvest and marketing of this valuable CITES Appendix II species have been accomplished through the leadership of GreenWood and Fundación Madera Verde.

GreenWood - Madera Verde
Report to the CITES
Plants Committee

Dublin, Ireland
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PREFACE

The unchecked and illegal exploitation of naturally occurring bigleaf mahogany (*Swietenia macrophylla* King) reserves resulted in its 2003 inclusion in Appendix II of the Convention on International Trade in Endangered Species, or CITES. This designation stipulates that the export and international trade of the species is subject to strict regulation. To that end, the management authority of each producing country must issue a finding that international trade in the species is not detrimental to its survival in the wild (CITES Appendix II, Article IV, paragraphs 2a and 3).

Honduras is one of 173 signatory parties to the CITES convention. On June 8, 2011, the Secretary General of CITES requested that the management authority of Honduras—the Secretariat of Agriculture and Livestock (SAG)—provide detailed information concerning the methodology it employs to establish so-called "non-detriment" findings vis-à-vis *S. macrophylla*. It was further recommended that the management authority of Honduras establish a conservative harvest and export quota for the species.

This report has been jointly prepared and submitted to the CITES Plants Committee by GreenWood and Fundación Madera Verde to augment information that may be provided by the management or scientific authorities of Honduras. GreenWood and Madera Verde are independent nonprofit organizations that have worked with mahogany-harvesting communities in Honduras since at least 2000.

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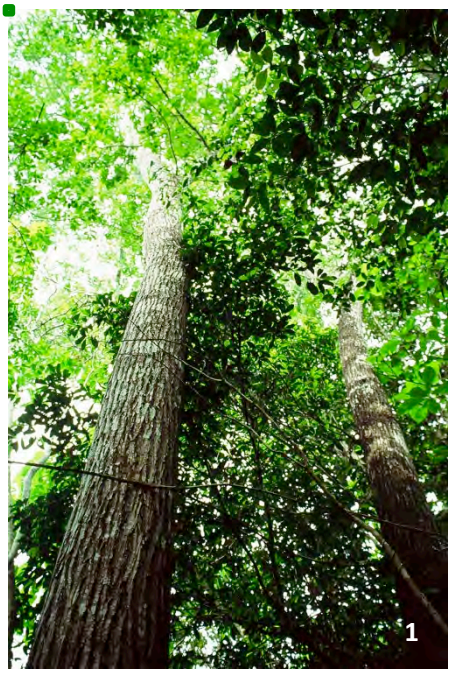

A Decade of Bigleaf Mahogany (*Swietenia macrophylla* King) Management, Harvest and Export in the Sico-Paulaya Valley, Honduras

1. INTRODUCTION

The illegal harvest of bigleaf mahogany (*Swietenia macrophylla*) has long been recognized as a severe problem in Honduras, generally, and within the Río Plátano Biosphere Reserve and the adjacent Sico-Paulaya Valley, in particular. In a diagnostic study on mahogany extraction in Honduras, Mendieta et al. (1999) determined that at least half of that harvest was illegal. In 2005, the Environmental Investigation Agency (EIA) estimated that eighty percent of mahogany from Honduras was obtained in violation of national law. Illegal mahogany harvesting in the region has worsened as legally recognized harvest areas are increasingly invaded with impunity, thwarting efforts to sustainably manage this biologically diverse and sensitive ecosystem. The 1.3-million-acre Río Plátano Biosphere Reserve provides habitat for 39 species of mammals, 377 species of birds and 126 species of reptiles and amphibians (Jaeger/IUCN, 2011). Castañeda (2007) documents the presence of flagship mammal species, such as the endangered Baird's tapir (*Tapirus bairdii*), the threatened West Indian manatee (*Trichechus manatus*) and the vulnerable giant anteater (*Myrmecophaga tridactyla*) (IUCN, 2012a). Bird species, such as the near-threatened harpy eagle (*Harpia harpyja*) and the charismatic scarlet macaw (*Ara macao*), among many others, are also represented (IUCN 2012b, c).

Recognizing that the production and sale of wood products from community forests have provided the primary economic incentives for local forest management and protection, GreenWood and Fundación Madera Verde have developed a transparent technical, administrative and legal management and harvest framework with three forestry cooperatives in the Sico-Paulaya Valley. This productive process is designed to add value to bigleaf mahogany by exporting high-quality, processed parts for the international musical instrument trade.

This report is based on more than ten years of documented experience in this enterprise—which began in 2000 and is ongoing today—most notably involving the production of mahogany guitar parts for the California-based Taylor Guitar Company. Madera Verde facilitates on-the-ground work in Honduras and GreenWood is responsible for coordinating interactions with Taylor and other clients. Both organizations collaborate in providing technical, administrative and legal support to the communities.

2. BACKGROUND

Forest management and the harvest of bigleaf mahogany (*S. macrophylla*) in the Sico-Paulaya Valley have a varied history. The Brisas de Copén (Copén) cooperative has been a pioneer in sustainable forest management since 1998, when it became one of first community forests in Latin America to become certified according to the principles and criteria of the Forest Stewardship Council (FSC). The Limoncito community forestry cooperative was established in 2003 and three neighboring communities (Miraflores, El Venado and Zapotales) formed the Miraveza cooperative in 2008. The various communities represented by these three cooperatives have a total combined population of at least 111 families and 615 residents, 14 percent of whom are members of their respective forestry cooperatives.

GreenWood began providing technical production and marketing assistance to the Copén group in 1999 and 2000. Initial assistance included the production of specialized, structural wooden timbers for the Schooner Amistad at Mystic Seaport Museum in Connecticut and the

preparation of sample guitar parts for the Taylor Guitar Company of California. In 2005 the high cost of certification and limited market interest led to the voluntary suspension of Copén's FSC certification, which was recently reinstated under a group certification obtained through the cooperative UNICAF-BRP.

As a result of this assistance, the Copén cooperative exported its first wood products in 2001. Since then, the GreenWood/Madera Verde partnership has facilitated multiple, appropriately scaled investments in infrastructure, equipment, training and administration to meet stringent quality standards, as well as to ensure an equitable distribution of benefits, transparent accounting practices, forest management and protection. In 2002 GreenWood installed a portable WoodMizer sawmill in Copén, in coordination with the Honduran nonprofit MOPAWI (*Moskito pawisa*, or "Development of La Mosquitia"), an investment that paved the way to two boatbuilding training workshops and the advanced production of mahogany guitar parts.

Since 2008 financial support from the United States Forest Service/International Programs has strengthened this assistance model to include, among other things, the establishment of a state-of-the-art, GPS-based, chain-of-custody system, the implementation of silvicultural practices such as diagnostic sampling, establishment of permanent sample plots, a planting plan focused on watershed restoration and live fences, and a pilot project to sample *S. macrophylla* DNA. The Miraveza and Limoncito cooperatives joined these productive ventures in 2008 and 2009, respectively, and this growing collaboration has also been assisted by other local organizations, such as Proyecto Ecosistemas (UNDP). In 2010 Copén was recognized by the United Nations Food and Agriculture Organization (FAO) as one of 18 model forest communities in Latin America (see Appendix II). In that same year, Madera Verde increased its capacity for assistance by establishing the office of the Danish-funded PROMAFOSI project in Las Champas, with the aid of the organization Forests of the World (previously Nepenthes). This project included assistance to five agroforestry organizations, including the three already engaged with GreenWood and Madera Verde in the management, harvest and export of *S. macrophylla*.

Currently, the production and sale of high-quality mahogany wood pieces represents the greatest value obtained by these communities through their agroforestry cooperatives, and it provides the foundation for their current and future economic and social development. The income from this increasingly diverse enterprise has totalled more than $USD 714,764 since 2005, which is equitably and transparently distributed between cooperative members and supports a variety of community infrastructure needs, such as home solar energy, micro-hydroelectric projects, road maintenance and school repair.

3. GEOGRAPHIC AND SOCIO-ENVIRONMENTAL CONTEXT

The three agroforestry cooperatives Brisas de Copén, Miraveza and Limoncito represent nine communities in the Sico-Paulaya Valley of northeastern Honduras, in the municipality of Iriona, Colón. Most of the forest areas assigned through usufruct agreements to these communities are also located within the buffer zone of the Río Plátano Biosphere Reserve (RPBR) **[Fig. 1]**. The RPBR was designated a UNESCO World Heritage Site in 1982 and was inscribed on the list of *endangered* World Heritage sites in 2011, at the request of the Government of Honduras.


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The Sico-Paulaya Valley (area: 34,021.49 ha) is one of the five identified areas in the "Territorial Ordering Plan" of the Municipality of Iriona, a recent program developed in 2010 with the financial assistance of Proyecto Ecosistemas (UNDP). According to this plan, the region comprises the principal (legal) source of income for area residents, given their intensive and extensive agro-pastoral productivity. The UNDP study concludes that: "The land in this area is of private and individual character, but is also managed collectively by the 32 cooperative agricultural associations that are established in the area with the support of the National Agrarian Institute (INA) of Honduras. The area is subject to highly conflictive encroachment and land-use practices, aggravated by the extensive invasions of nationally owned forests, which are designated for local community management."

SICO-PAULAYA VALLEY

Considering the proximity of community forest areas to the western boundary of the Río Plátano Biosphere Reserve **[Fig. 1]**, the GreenWood/ Madera Verde collaborative model promotes a high level of sustainability, transparency and community participation. It has proven attractive to local communities and could contribute significantly to a more stable, orderly and sustainable regional transition from low-intensity forestry to agriculture.

HONDURAS

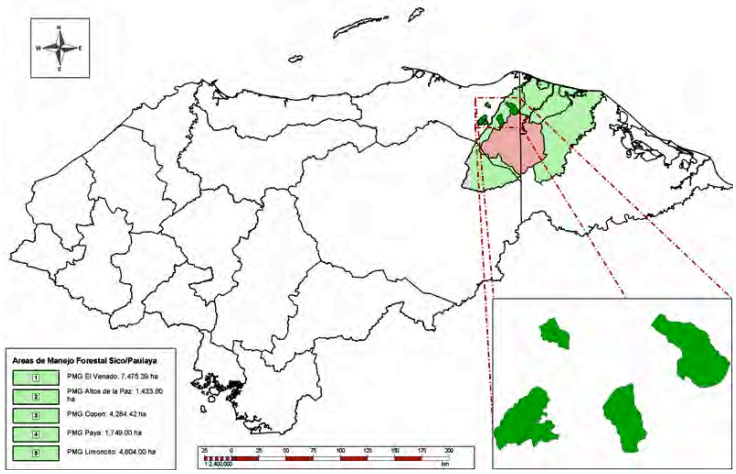


Figure 1: Sico-Paulaya harvest areas under legal forest management (bottom center, clockwise): Limoncito, Paya, Copén, Altos de la Paz and Miraveza. Shaded areas represent the core (red) and buffer zone (green) of the Río Plátano Biosphere Reserve. [PROMAFOSI, 2010]

Year after year, these cooperatives, assisted by Madera Verde and GreenWood, have fulfilled their forest-management objectives through their productive activities, consecutively implementing their annual management and operational plans for a total of 16,539 hectares of forest, under contracts approved by the government forest service, the Instituto Nacional de Conservación Forestal (ICF).

The economic incentives derived from this high-quality productive enterprise and high-value international sales have been the primary drivers of a positive and proactive participation of community producers in the resource management and conservation of their forests. This enterprise has resulted in a significant contribution to a wide variety of community social, health, educational, infrastructure and economic activities, which are leading to the tangible improvement and development of life in this otherwise precarious forest frontier. Residents of participating communities now derive tangible benefits from accident insurance, road improvements, school funds and a host of other local investments. In Copén, for example, the community invested $US 47,334 between 2007 and 2011 in more than 20 discrete types of social and economic infrastructure. (See Appendix I, on page 20, for a complete description.)

Members of all three cooperatives actively participate in forest protection and the application of silvicultural prescriptions in their forest management plans. Forest-protection brigades of community members undertake regular patrols to monitor their management areas. In recent months, however, the invasion of community forests and extensive damage to harvest areas has increased without any interference from civil or military authorities. The absence of any legal response to these incursions has led to their proliferation, in deliberate violation of both the communities' legal rights and State interests **[Photo 5]**.

4. EXPORT ANALYSIS

Following an initial learning curve in adapting to market criteria, each cooperative has successfully fulfilled the quality and volume requirements for every order they have received. The three groups have maintained an average utilization percentage in excess of fifty percent relative to authorized volumes, according to ICF receipts and transport records **[Table 1]**. The communities' clients and GreenWood have supported this "apprenticeship" process through their tolerance of production delays, as well as their commitment to local training. These investments have facilitated a continual improvement in achieving the quality norms and expectations of the marketplace, which has led to the export of a much wider range of wood grades—now including firsts, seconds, thirds and fourths—than was originally specified in the initial guitar-part shipments. In addition to the high price paid by guitar-part clients for a quality product, this enterprise is greatly expedited by a favorable program of advance payments.

The success of this productive enterprise has been impacted by the increasing prevalence of heart rot **[Photo 6]**, stain and prominent veins in the harvested wood. Notwithstanding the longevity and experience of the Copén cooperative, a higher incidence of these naturally occurring "defects" in their trees has resulted in a lower export percentage for Copén and Limoncito than for Miraveza **[Table 1]**. The causes of these quality factors are poorly understood, and few management approaches have effectively addressed the problem, beyond quantifying their

intensity (Kometter and Maravi 2007; Grogan and Schulze 2008). Madera Verde and GreenWood are currently cultivating research partnerships and a student internship program with several North American universities to gather more data on these and other naturally occurring phenomena that affect the quality and regeneration of *S. macrophylla*.

COOPERATIVE	PERIOD	AUTHORIZED VOL. (bd. ft.)	EXPORTED VOL. (bd. ft.)	AVERAGE % of EXPORT
Brisas de Copén	2004 - 2010	137,185	65,214	48 %
Miraveza	2007 - 2010	52,407	31,212	60 %
Limoncito	2008 - 2010	34,560	14,833	44 %
TOTAL		**224,152**	**111,259**	**51 %**

Table 1: Volume authorized and exported by cooperative, 2004 – 2010. [PROMAFOSI/FMV, 2010]

The proportion of exported mahogany has increased dramatically, from 39 percent of the first Copén harvest in 2004 to 67 percent of the harvest of all three cooperatives in 2010. There was a greater than 10-percent reduction in export-quality wood during the 2008/2009 season, however, due to very high levels of heart rot encountered in Limoncito relative to the other two cooperatives.

Between 2004 and 2011, the principal export client has been the Taylor Guitar Company of El Cajon, California. Beginning in 2009, however, the Taylor contracts have been augmented by purchase orders from several additional U.S. musical instrument manufacturers and distributors. These clients typically require even higher quality and more specific dimensions than Taylor, but their orders are accompanied by commensurately higher prices. What's more, the relatively shorter lengths and smaller dimensions of the specified parts also allow for more efficient use of harvested timber, thus increasing the proportional yield of exported mahogany.

5. HARVEST PROCESS

5.1 Authorization of Management Plans:

The cooperatives' harvest and production of bigleaf mahogany and other tree species is governed by general Forest Management Plans and annual Operational Harvest Plans, authorized by the Honduran forest service, ICF. These are based on the Social Forest Management System (Article 77, Fund for Protected Areas and Wildlife) and adjusted, as necessary, to comply with the technical and administrative norms and resolutions approved by the ICF (Article 70, Fund for Protected Areas and Wildlife).

According to the general management plans approved for these three groups during the previous five-year period (2005 - 2010), 503.9 m^3 were authorized as the Annual Allowable Cut for bigleaf mahogany (*S. macrophylla*), or 90,702 bd. ft. per year (using the ICF's conversion factor of 180 bd. ft./m^3; also used in EIA 2005) **[Table 2]**.

COOPERATIVE	COMMUNITIES INVOLVED	GENERAL AREA MANAGEMENT PLAN (Ha)	PRODUCTIVE FOREST AREA (Ha)	ANNUAL ALLOWABLE CUT (m^3/year)	
				Total	*Swietenia macrophylla*
Brisas de Copén	Copén, Brisas del Paulaya	4,284	1,124.82	1,072.9	118.7
Miraveza	El Venado, Miraflores, Zapotales	7,450	3140.57	1,508.5	182.4
Limoncito	Limoncito, La Paleta, La Presa, Las Champas	4,804	3,001.00	1,382.0	202.8
TOTAL		**16,539**	**7,266.96**	**4,963.4**	**503.9**

Table 2: Agroforestry cooperatives participating in mahogany exports. [PROMAFOSI/FMV, 2011]

The following fees are paid by the cooperatives to authorize their Operational Harvest Plans:

a. **Stumpage Fee:** Paid to the ICF for the harvest of a particular species, which for *S. macrophylla* is Lps. 1,500 ($USD 78.94) per m^3.

b. **Municipal Taxes**: Paid to the Municipality of Iriona, where the harvest takes place. This municipal tax is Lps. 1.00 ($USD 0.05) per board foot.

5.2 Tree Marking:

Once permits are granted, a site visit is performed by the ICF, Madera Verde technicians and cooperative members. Harvest and seed trees are identified on the Baseline Harvest Map in the approved management plan **[Fig. 2]**, and annual cutting area limits are delineated with white paint. This process is part of the cooperatives' annual activity plan, developed with Madera Verde.

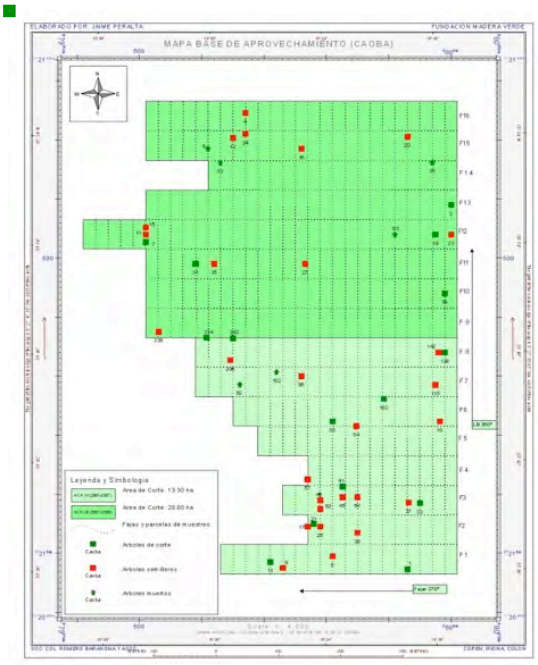


Figure 2 (right): Baseline Harvest Map, indicating trees selected for harvest and retention. [Operational Harvest Plan, Copén, 2006-2007]

Harvestable trees are selected for their vigorousness and phenotypic characteristics within predetermined numerical limitations, though many of the healthiest trees are also retained for seed production. In the cutting areas of the Sico-Paulaya cooperatives, seed trees are marked with an "S" and a double ring at breast height **[Photo 7]**.

COOPERATIVE	HARVEST AREA (Ha)	EXISTING TREES	TREES to be HARVESTED	SEED and/or RESERVED TREES	% of TREES HARVESTED	REMNANT TREES/Ha
Brisas de Copén	23.00	21	8	13	38.1	0.56
Miraveza	35.89	34	15	19	44.1	0.53
Limoncito	16.86	30	13	17	43.0	1.01

Table 3: Seed Tree Distribution by Cooperative. [Operational Harvest Plans, 2011]

Harvestable trees are marked in the forest according to the Baseline Harvest Map **[Fig. 2]**, at or higher than the DBH (diameter at breast height, 1.3 m from the highest buttress). Each harvestable tree is also marked at the base, or stump, with a spray-painted letter "C" to facilitate post-harvest monitoring. Harvestable trees include those that are:

- Greater than or equal to the MCD
- Well-spaced and not continuous
- Not hollow or rotten

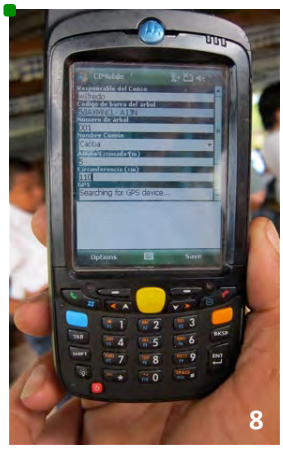
5.3 Low-Impact Harvest Techniques:

In the cutting areas of Sico-Paulaya, the following practices are applied to minimize negative harvest impacts:

- Directional felling
- Sawmilling with guided chainsaws ("Alaska" mills or "*marcos*")
- Resawing with portable bandsaw mills
- Animal transport (mules)

5.4 Chain of Custody:

In 2008 GreenWood and Madera Verde, with the financial support of the United States Forest Service/International Programs, introduced handheld computers and software from Helveta LLC into the production process of the Brisas de Copén cooperative for the purpose of tracking the legal chain-of-custody of the group's *S. macrophylla* guitar parts from the forest to the client. Technicians from Madera Verde, ICF, Proyecto Ecosistemas and the Brisas de Copén cooperative were trained by Helveta technicians to implement this sophisticated, satellite-based tracking system, which has since been integrated into the production processes of all three cooperatives.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This technology provides a high level of traceability and facilitates legal control and verification throughout the chain of custody. It tracks all aspects of production—from harvest and sawmilling to local transport, kiln drying and international shipping. The location and physical properties of each harvested tree are entered in a handheld computer, or personal digital assistant (PDA) **[Photo 8]**, and the data is linked to barcoded tags attached to the wood. This information is

monitored through an Internet database, with provisions for secure online access by designated operators.


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The productive process consists of three main steps: **Harvest,** including tree identification, felling, chainsaw milling of cants and transport to the sawmill gallery; **Sawmilling,** including WoodMizer processing and transport to the kiln; and **Kiln-Drying and Final Product Preparation**, including its reclassification (grading), trimming and packing of the container.

Harvest begins with tree mapping, or geo-referencing, every tree to be harvested, with the PDA. Once the tree is felled **[Photo 9]**, the end of each log is painted to retard evaporation and cracking, and a plastic barcoded label is affixed to the stump **[Photo 10]**. The PDA reads the barcode and records the personal identification of the technician, along with the relevant data for each tree: harvest date, tree number, species, estimated commercial height, circumference and estimated length of the first log. The system also records the tree's GPS location.


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Next, the harvestable logs are transformed into cants, or *bloques*, by means of a portable, guided ("Alaska") chainsaw mill, or *marco* **[Photo 11]**. Every cant processed in the forest is identified with its own plastic thermal barcoded tag and recorded, by means of the PDA. It is linked to the information from the original, "parent" tree by reading the tree barcode assigned in the previous step. New information entered in this step includes the width, thickness and length of each chain-sawn cant, in addition to the anticipated market (national or export). The barcoded cants are then transported to the community sawmill, typically by mule **[Photo 12]**.


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Sawmilling begins with the receipt of cants at the community sawmill. The PDA reads the barcode on each arriving cant and dimensional information is re-entered in the system to verify that the arriving product is consistent with the one that departed the forest harvest site. New information is also incorporated, such as the GPS location of the sawmill and the date of receipt, as well as the transport method, chain code (the last two digits of the barcode, which are used for tracking by ICF) and the identity of the operator.

The resawing process commences at the Wood-Mizer bandsaw mill in each community, where the cants are resawn to meet the anticipated dimensional requirements of their probable market **[Photo 13].** The barcode of each cant is registered with the PDA before resawing, and the date and name of the sawmill operator are recorded. Once a cant has been


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processed, the old barcode tag is removed and a new tag is stapled to the end of each new piece **[Photo 14]**. These are referenced to the previous cant barcode and logged into the system, along with the dimensional and qualitative data of each new piece: thickness, width and length, probable grade classification and the ICF chain code. The resawn pieces are then transported, usually by truck, to the kiln-drying facility.

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Kiln-Drying and Final Product Preparation takes place at one of several commercial establishments, whose services are contracted for this purpose. The sawmilled pieces are received and logged in with the PDA upon entry to the kiln, reiterating the procedure that took place at the sawmill by inputting the date of reception, source community, kiln site and operator, ICF chain code, GPS coordinates and observations. As before, this verifies that the pieces received correspond to the harvested material previously registered.

After the pieces are thus recorded, they enter the drying kiln, where they remain for a highly variable period of time—typically between two weeks and two months, depending on their dimensions—until they achieve the desired moisture content of approximately 8 to 9 percent.


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Upon exiting the kiln, each dried piece is trimmed, end-painted and reclassified according to its final quality designation. At that point, the barcode tag the piece has carried since it was resawn in the community is removed and replaced with a new barcode **[Photo 15]**. As before, the PDA registers the original tag before reading the new barcode, recording the date, wood source, final dimensions (thickness, width and length) and wood grade. (The final dimensions and grade often vary from the initial dimensions and grade assigned at the community sawmill.) After the pieces have been reclassified, they are assembled into banded pallets, or "*bultos*." Each banded pallet is assigned a single, new barcoded tag, which registers the date, source, pallet number, number of pieces and all of the barcodes incorporated in the load. When the container is packed, it is assigned a bill of lading and a single barcode, which incorporates the date, container number, customer, shipping route and the barcode of every banded pallet in the final shipment. This final container barcode thus includes all of the relevant information related to the original trees in the community forest, where the export wood was harvested.

5.5 Post-Harvest Inspection and Planting:

Following the harvest, an authorized ICF technician is required to perform a field inspection of the Annual Cutting Area, which verifies that all aspects of the harvest were performed in accordance with the operational plan's technical prescriptions. This inspection also conforms to Executive Degree PCM-02-2006, which requires that owners and usufructuaries replant every harvested tree with three new trees—a fundamental requirement for renewal of the annual harvest permits. To lower costs, replanted trees can include transplants of healthy seedlings from elsewhere in the forest.

6. LEGAL AND ADMINISTRATIVE ACTIVITIES FOR EXPORT

6.1 Export Certification:

An export certificate is provided by the regional ICF office, which in the case of Copén is obtained from the regional office of the Río Plátano Biosphere Reserve, located in Tegucigalpa. For this application, Madera Verde presents copies of all local sales and original transportation receipts for all wood sold to local and export markets.

6.2 CITES Certificate:

Globally, the three CITES appendices include some 5,000 species of animals and 28,000 species of plants. Bigleaf mahogany (*Swietenia macrophylla*) is one of the plant species listed in Appendix II, which is intended to protect species threatened with extinction against "utilization incompatible with their survival" (CITES 2012). A CITES certificate, based on a so-called "non-detriment" finding issued by the scientific authority of Honduras, is therefore required for the export of all mahogany logs, sawn wood, veneer and plywood of "wild" origin. Without this certificate, mahogany cannot legally enter any other CITES-signatory country to which it is shipped.

The Honduran institution responsible for issuing the CITES certificate is the Secretariat of Agriculture and Livestock (SAG). The CITES application must be presented to SAG by the producer's authorized, legal representative, with the power of attorney. SAG submits the application, in turn, to the ICF for approval by its Protected Areas, Production and Legal departments, and authorization by the ICF Minister. Upon approval, the certificate is signed by the Minister of SAG and returned to the producer's representative, Madera Verde.

6.3 Customs Declaration and Repatriation of Foreign Currency:

This is a legal document issued by the Central Bank of Honduras (BCH) to affirm that the entity undertaking the export has received foreign exchange (payment) for the product being exported. The exporter has 45 days, after shipping its product, to provide documentation that the corresponding foreign exchange has been received in its entirety. In case of noncompliance, the exporter must pay a fine to the Customs Agency, Aduanera del Norte. When the export has been undertaken more than once, the BCH verifies that the entity does not have any outstanding declarations, e.g. that the value of all previously exported products has been paid for, in full. (Until recently Madera Verde has been the exporter of record for all shipments, but this function—like many others in the productive and export process—is being gradually transferred to the individual cooperatives.)

6.4 Phytosanitary Certificate:

Phytosanitary documentation is obtained by the Honduras Customs agent, or broker, from the National Service of Agro-Pastoral Sanitation (SENASA). This document certifies that the shipment has been carefully inspected by an official of the Plant Sanitation Unit and does not represent a contamination risk to the importing country. The heat generated during the kiln-drying process is generally considered sufficient to eliminate the risk of contaminants.

7. SILVICULTURAL CRITERIA FOR CALCULATION OF ANNUAL CUTTING VOLUME

In the preparation of management plans, we apply a polycyclic system that considers the representation of forest species (floristic composition), the number of individuals and the basal area for diametric categories (structure) to determine its management viability and silviculture by fixing minimum cutting diameters and cutting cycles. The data collected during the general inventory are processed using the program IBL 2.0 to obtain the following

parameters for the species: number of trees/ha, basal area (m^2/ha) and volume (m^3/ha). Results are then grouped into volume tables for each diameter class **[Table 4]**:

Cooperativa	Variables	CLASES DIAMETRICAS									Total
		10-19.9	20-29.9	30-39.9	40-49.9	50-59.9	60-69.9	70-79.9	80-89.9	>90	
Copen	Arb/ha					0.149		0.447	0.149	0.349	*1.094*
	A.B/ha					0.034		0.184	0.075	0.790	*1.083*
	Vol/ha					0.638		2.427	1.179	9.828	*14.072*
Paya	Arb/ha		0.500	0.250		0.250		0.250			*1.250*
	AB/ha		0.033	0.030		0.049		0.110			*0.222*
	Vol/ha		0.262	0.218		0.657		1.540			*2.677*
MIRAVEZA	Abr/ha	0.240					0.050	0.150	0.050	0.240	*0.730*
	AB/ha	0.000					0.020	0.060	0.030	0.270	*0.380*
	Vol/ha	0.060					0.190	0.560	0.320	3.930	*5.060*
Limoncito	Arb/ha				0.520	0.104	0.104	0.208	0.416	0.312	*1.664*
	AB/ha				0.065	0.025	0.032	0.080	0.226	0.491	*0.919*
	Vol/ha				0.508	0.092	0.241	0.700	1.908	4.838	*8.287*
Altos de la Paz	Arb/ha			1.666	2.000	0.770	0.400	0.333	0.800	0.385	6.354
	AB/ha			0.189	0.290	0.176	0.128	0.147	0.417	0.344	1.6905
	Vol/ha			1.695	0.690	1.276	1.784	0.796	4.687	4.384	15.3115
Promedio General	Arb/ha	0.048	0.100	0.383	0.504	0.255	0.111	0.278	0.283	0.257	2.2184
	AB/ha	0.000	0.007	0.044	0.071	0.057	0.036	0.116	0.150	0.379	0.8589
	Vol/ha	0.012	0.052	0.383	0.240	0.533	0.443	1.205	1.619	4.596	9.0815

Table 4: *Swietenia macrophylla* by diameter class per unit area, in terms of number of trees (Arb/ha), Basal Area (AB/ha) and Volume (Vol/ha), Sico-Paulaya cooperatives. [Forest Management Plans: Copén (2005-10); Paya (2008-13); Miraveza (2008-13); Limoncito (2004-09); Altos de la Paz (2005-10)]

7.1 Minimum Cutting Diameter:

The Minimum Cutting Diameter (MCD) is derived from data in the original forest inventory, which is included in the forest management plan for each community group. It is similar or more conservative than most MCDs for neotropical non-plantation *Swietenia macrophylla* harvest (e.g. Guatemala, UNEP-WCMC 2009; Brazil, Grogan et al. 2008). In the experience of the Sico-Paulaya cooperatives, *S. macrophylla*'s basal area distribution (stems/ha) is concentrated in the upper diameter classes (mature trees larger than the MCD), which makes basal area recovery difficult following harvest, as the small seedlings released for growth require decades to compensate wood volume, even if regeneration is successful. Moreover, it is difficult to diversify the range of tree species harvested, as *S. macrophylla* is the only timber tree that justifies the high cost of extraction in this remote region. However, adherence to the MCD also tends to eliminate mature trees that contribute little to annual wood production and substantially to competition, providing strong potential for basal area recovery. Depending on local diameter distributions, the forest technician responsible for the implementation of the operational plan can propose MCD modifications between sites by presenting case-specific technical justifications.

TECHNICAL CRITERIA	BRISAS de COPÉN	LIMONCITO	MIRAVEZA	AVERAGE
MCD (cm)	80	90	70	80
CI (%)	50	75	50	58.3
AAC (m^3/year)	118.7	192.2	183.0	114.4

Table 5: Minimum Cutting Diameters (MCD), Cutting Intensity (CI) and Annual Allowable Cut (AAC) of three community groups. [FMV/PROMAFOSI, 2011]

S. macrophylla research from the past 20 years suggests that adherence to minimum cutting diameters does not adequately address the species' complex regeneration requirements, largely because the removal of individual (large) trees does not create a sufficient disturbance

or opening for this shade-intolerant species to regenerate (Mayhew and Newton 1998; Snook 1993; Gullison et al. 1996; Grogan et al. 2001). In addition, while little data has been gathered on heart-rot distribution, it has been noted that this defect tends to be concentrated in large-diameter trees (e.g. Grogan and Schulze, 2008), and a harvest diameter range that excludes the largest trees may be more appropriate to long-term species survival and economic viability. To help address these and other related issues, GreenWood and Madera Verde are developing a research partnership with the Yale University School of Forestry and Environmental Studies and the University of Toronto. By involving researchers in data collection and analysis, we hope to be better equipped to determine the silvicultural requirements of successful mahogany regeneration in this ecological context.

7.2 Cutting Cycle:

The Cutting Cycle (CC) is the number of years between two harvests in the same area, determined by the growth rate and the basal area recovery from trees that have been previously harvested. Until recently, the established 30-year cutting cycle was based upon a diameter growth rate of 0.5 cm/year from Costa Rica (Quiros and Finnegan 1994), which is conservative compared to recorded growth rates in Belize (Lamb 1966; Shono and Snook 2006) and Brazil (Grogan 2002). However, some researchers suggest that such short (25-to-40 year) cutting cycles are insufficient to allow for adequate regeneration (e.g. Mayhew and Newton 1998; Snook 1993), a position that is supported by preliminary studies in Copén (Murillo 2011). Seedling regeneration from three-to-six-year-old harvest sites were evaluated according to Sabogal's method, and very few trees were found to be developing beyond small seedlings. Accordingly, on November 10, 2011, the cutting cycle was increased to 40 years for all Honduran broadleaf species (ICF, 2011), which may be re-evaluated depending on future regeneration. An aggressive three-year planting plan is also being implemented in Copén, with more than 460 seedlings planted in 2011. These measures are intended to help ensure viable future *Swietenia macrophylla* populations.

7.3 Cutting Intensity:

Cutting intensity (CI) is the percentage of volume that may be extracted from trees exceeding the established MCD. It is estimated as a proportion of a commercial species' basal area, calculating various cutting intensities for different ranges of diameter classes and to obtain a weighted average according to their general distribution. The 25-to-50-percent retention of trees larger than the MCD—the inverse of the CI shown in Table 4—is considerably higher than practiced in Brazil, which only required a 20-percent retention rate in the revised 2003 regulatory framework. Similar or lesser rates are enforced in Peru and Bolivia (Grogan et al. 2008; Mejía et al. 2008).

7.4 Annual Allowable Cut:

The Annual Allowable Cut (AAC)—soon to be released in updates to the ICF's forest management guidelines—is intended to reflect the forest's capacity to produce wood without reducing its long-term viability:

$$\textbf{AAC FORMULA} = \frac{\text{Vol/ha} \times A \times CI}{CC}$$

AAC: Annual Allowable Cut
Vol/ha: Volume (m^3/ha) extracted from cutting area
A: Area
CI: Cutting Intensity
CC: Cutting Cycle

Species	MCD/Site		CI/Site		AB/>MCD		VOL/>MCD	
	Sangui.	Marañones	Sangui.	Marañones	Sangui.	Marañones	Sangui.	Marañones
S. macrophylla	80	90	50	50	0.638	1.017	7.184	13.651

AAC: $\frac{7.184 \times 855.67 \times 0.50}{30} + \frac{13.651 \times 269.15 \times 0.50}{30}$ = **102.45 + 61.24 = 163.70 m^3/year**

Formula 1; Table 6: Formula for the calculation of AAC for Sanguijuelosa and Marañones forests, Copén Management Plan; AAC equation. [AFE-COHDEFOR, 2002; ICF, in process]

7.5 Basal Area (m^2/ha):

The total Basal Area is calculated as the sum of the individual basal areas of forest trees to determine the appropriate intensity of silvicultural interventions. The basal area extracted and damaged by the harvest, with corresponding silvicultural treatments, should never exceed 35 percent of the initial basal area for strata with basal area greater than or equal to 25.0 m^2/ha. In the case of a stratum with a basal area between 21 m^2/ha and 24.9 m^2/ha, the basal area will be reduced to 16 m^2/ha **[Table 7]**:

Existence (m^2/ha)	Reduction
≥ 25.00	35 %
Between 21.00 – 24.99	30 %
≤ 21.00	Retains ≥ 16.00 m^2/ha

Table 7: Basal Area for Intervention, according to development strata. [AFE-COHDEFOR, 2002, p.14]

Under the current norms for broadleaf forests, the total basal area should never be reduced by more than 10 m^2/ha. The basal area removed should have recovered during the cutting cycle to an optimal level before harvest activities are permitted to resume. Research in Bolivia by Gullison et al. (1996), which recommends maximizing seed production per unit of retained basal area, might be beneficially applied to specific sites in Sico-Paulaya community forests to improve regeneration.

7.6 Protected Areas within Community Forests:

Nearly half of the combined area of these three community forests is completely protected from legal harvest **[Table 8]**, providing watershed protection and wildlife habitat, as well as potential seed and genetic reserves for future forest management.

COOPERATIVE	LEGAL RESOLUTION	VALID UNTIL	GENERAL AREA MANAGEMENT PLAN (Ha)	PROTECTED FOREST AREA (Ha)	PROTECTED (%)
Brisas de Copén	GG-PMF/016-2004	2010	4,284	3,024	71%
Miraveza	GG-PMF-054-98	2013	7,451	3,775	51%
Limoncito	GG-PMF-049-2008	2009	4,804	998	21%
TOTAL			**16,539**	**7,797**	**47%**

Table 8: Protected Forest Relative to Total Management Area, Copén, Miraveza and Limoncito.

8. CONCLUSIONS AND RECOMMENDATIONS

As in other broadleaf forest management areas in Honduras, silvicultural plans and/or treatments have been inconsistently applied in the Sico-Paulaya Valley, resulting in a lack of reliable information on regeneration and post-harvest forest conditions in the area. It is urgent that the ICF act quickly to deploy its reinvestment fund for forest owners and usufructuaries, such as community forestry organizations, which would enable local forest managers to implement the prescribed silvicultural treatments in their management plans. We further recommend that research activities be undertaken to enable a range of biological studies.

Considering that an export quota has not been scientifically established in Honduras, harvest limits have been determined by the Annual Allowable Cut, which is the estimated volume of wood that a forest can regenerate in a harvest interval. This is the basis of the Sico-Paulaya management plans, and the AAC is intended to comply with the CITES Secretariat's recommendation to establish a conservative export quota. Even if such a quota were scientifically determined to be more or less than the current AAC, the enforcement of existing logging laws is of more urgent concern. In the absence of effective enforcement, the survival of *S. macrophylla* will continue to be threatened by the illegal invasion and forest conversion to agriculture—even in areas under authorized and active management, as in the Sico-Paulaya cooperatives. To counteract illegal mahogany extraction, we strongly recommend the continued promotion of existing accountability measures, such as the chain-of-custody timber-tracking system, which is also consistent with the Manual of Methodology of the Chain of Custody for Mahogany (*Swietenia macrophylla*) and Spanish cedar (*Cedrela odorata*) (Ministerial Agreement 047-201).

To ensure that the methodology determining *S. macrophylla* harvest levels promotes the long-term survival of the species, standardized norms should be based on a thorough review and analysis of relevant silvicultural parameters, such as Basal Area, Minimum Cutting Diameter, Cutting Cycle and Cut Intensity, all of which currently comprise the basis of management plans.

Pending results from these and other recommended studies, we believe ***it is essential to apply conservative harvest criteria, without undermining the legitimate interests, needs and aspirations of members of the local forestry organizations that rely on forest production for their subsistence.*** Indeed, these communities represent the primary bastion—and our best hope—for preventing complete forest destruction in the region, and their valuable role has been widely recognized by international organizations, such as FAO, IUCN and UNESCO.

A pre-emptive suspension or a precipitous reduction of international trade in bigleaf mahogany (Swietenia macrophylla) from Honduras would present an alarming threat to all of these productive, social and environmental initiatives, which have been nurtured so successfully in these cooperatives and communities. The negative impacts of such a measure can be expected to:

- Weaken or destroy a demonstrated model of responsible forest management that has been implemented by cooperatives in the region for more than ten years. This model has benefited communities through the purchase of forestry equipment, community forest protection, silvicultural practices (diagnostic samplings, permanent plots, reforestation), satellite traceability systems and other initiatives that comply with international norms and agreements like FLEGT and the U.S. Lacey Act.
- Reduce market opportunities and sale of wood products from ICF-assigned forest areas, according to Article 77 of the Wildlife and Protected Areas Forest Act. This

includes over 26,000 ha from 17 communities established around the Río Plátano Biosphere Reserve and the Sierra del Río Tinto Forest Reserve, two major protected areas. It would also increase the already-acute management and protection problems associated with these endangered forest reserves.

- Reduce the legal export earnings for Honduras, with an associated decline in GDP. The foreign exchange generated from exports by Madera Verde and GreenWood-supported cooperatives has totalled at least $USD 714,764 since 2005.
- Reduce government tax revenue from wood products, at local and national levels.
- Reduce the income of more than 180 families directly or indirectly benefitting from the harvest and export of wood products, which in recent years has contributed substantially to improvements in family and community living standards.
- Increase the supply of legal wood, derived from approved management plans, on the national market by an estimated 667.52 m^3. This would inevitably depress prices for legal wood and make the viability of forest management even more tenuous, as the sale price for legal wood in national markets cannot currently compete with the low price of illegal wood, thus providing further incentives for illegal trafficking.

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12. PHOTO CREDITS

1: Bigleaf mahogany (*Swietenia macrophylla*) tree. GreenWood.
2: Sico River, foreground; Río Plátano Biosphere Reserve, background, 2011. GreenWood.
3: Miraflores, Honduras, panorama, 2011. B. Taylor.
4: Sico River raft, 2003. GreenWood.
5: Illegal invasion in the Copén community forest, La Sanguijuelosa, 2011. GreenWood.
6: Mahogany heart rot, Copén community forest. Fundación Madera Verde.
7: Designated seed tree, 2011. Fundación Madera Verde.
8: Personal digital assistant (PDA), 2011. B. Taylor.
9: Mahogany tree felling, Copén. Fundación Madera Verde.
10: Barcoded tree-stump, 2011. B. Taylor.
11: Copén sawyers, German Barahona (left) and Fausto "Titón" Rosales (right), chainsaw milling mahogany cants. Fundación Madera Verde.
12: Transporting chain-sawn cants from forest to sawmill, Miraflores, Honduras. Fundación Madera Verde.
13: Copén sawyer and wood grader, Samuel Hernandez. Fundación Madera Verde.
14: Attaching barcode tags to mahogany guitar wood, 2011. B. Taylor.
15: Installing new barcodes at kiln, before packing container. Fundación Madera Verde.
16: Welcome to: Copén, Iriona, Colón, Honduras, 2011. GreenWood.

13. APPENDIX I

COMMUNITY INVESTMENTS BY THE BRISAS DE COPÉN COOPERATIVE: 2007–2011		
DETAIL	**$ USD**	**%**
PRODUCTION EQUIPMENT	**$28,711**	**60**
Forest production (chainsaws, Alaska mills, etc.)	5,462	
Safety equipment	40	
Wood-Mizer bandsaw mill	18,000	
Pick-up truck	5,208	
COMMUNICATION	**$1,854**	**4**
Satellite telephone service	1,563	
Portable radio	174	
Cell phone	117	
SOCIAL INFRASTRUCTURE	**$8,353**	**18**
Accident insurance	3,511	
School supplies	104	
Energy project	285	
Family Fathers Society	130	
Water Committee	104	
Road repairs	1,094	
Patronato (community government)	469	
FOREST PROTECTION	**$4,937**	**10**
Delimitation of forest boundaries	1,849	
Forest inspection/protection patrols	3,087	
PHYSICAL INFRASTRUCTURE	**$2,678**	**6**
Sawmill shed maintenance	1,493	
Bunkhouse maintenance	1,185	
GENERAL FOREST MANAGEMENT PLAN	**$931**	**2**
GRAND TOTAL	**$47,464**	**100**

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14. APPENDIX II

FAO Model Forest Diploma, awarded to Copén Cooperative, October 2010:

La Comisión Forestal para América Latina y el Caribe confiere el presente:

DIPLOMA

A *la Sociedad Colectiva Romero Barahona y Asociados del Bosque Comunal Copen*
por la excelencia en la implementación de procesos y prácticas de manejo forestal sostenible
y su contribución a la sostenibilidad de los bosques de nuestra Región.

Este reconocimiento se enmarca en el estudio regional "En Busca de Casos Ejemplares de Manejo Forestal Sostenible en América Latina y el Caribe", que ha sido ejecutado a través de la FAO con la cooperación de la Junta de Castilla y León de España.

Octubre de 2010

Josué Iván Morales Dardón
Presidente COFLAC
Gerente
Instituto Nacional de Bosques, Guatemala

Carlos Marx Carneiro R.
Secretario, COFLAC
Oficial Principal Forestal
Oficina Regional de la FAO para
América Latina y el Caribe

15. APPENDIX III

UNESCO letter to Bob Taylor, commending the Taylor Guitar Company for its support of mahogany management and forest enterprise in El Venado, one of three communities comprising the Miraveza cooperative in the Río Plátano Biosphere Reserve buffer zone.

United Nations
Educational, Scientific and
Cultural Organization

Organisation
des Nations Unies
pour l'éducation,
la science et la culture

Organización
de las Naciones Unidas
para la Educación,
la Ciencia y la Cultura

Организация
Объединенных Наций по
вопросам образования,
науки и культуры

منظمة الأمم المتحدة
للتربية والعلم والثقافة

联合国教育、
科学及文化组织

Culture Sector

Mr. Bob Taylor
Founder and President,
Taylor Guitars
1980 Gillespie Way,
El Cajon, CA, 92020
USA

Paris, 3 March 2011

Dear Bob,

UNESCO's World Heritage sites are the modern "wonders of the world". For a site to be part of this prestigious group, countries must submit applications to UNESCO's World Heritage Committee – which is made up of representatives from 21 countries – for a rigorous technical review. If their proposed site meets strict standards, they are officially invited to "join the club" – on condition that they commit to maintaining the club's standards.

As part of my job, I get to inspect World Heritage sites around the world, to see if national governments are indeed respecting their commitment to protect them for future generations.

It was while I was on such a trip last month that I ended up in the small settlement of El Venado, on the boundary of the Rio Platano World Heritage site in Honduras. I was taken to see the local forestry cooperative. While there, I learned that their operations had been officially certified as "sustainable" under the Forest Stewardship Council's criteria. I also learned that one of their main markets for the mahogany wood that they extracted from their protected forest was Taylor Guitars.

I write to inform you of the real impact you are having by sourcing your wood from El Venado. The campesinos were very proud to tell me that the highest grade of the wood they harvested was going to Taylor Guitars. This resulted in them being able to get a better price for this wood than those being offered at the local lumber yards, thus encouraging them, and neighbouring communities, to see the value in a well managed forest.

I'm sad to report that though the forest from which your wood is being sourced is well managed and its future seems bright, nearby tropical forests continue to be cut down and replaced with extensive cattle ranches. I can only hope that the example you are helping to set at El Venado will encourage others to do the same, and demonstrate that there is an alternative to replacing wildlife rich stands of virgin tropical forests with cattle ranches.

Yours sincerely,

Marc Patry
Programme Specialist
World Heritage Centre

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