Paubrasilia echinata bows: Fine tuning traceability solutions

Prepared under Decision 19.249 paragraph b)

Convention on International Trade in Endangered Species of Wild Fauna and Flora

Version 2

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Acknowledgments

This report has been developed by the CITES Secretariat in accordance with Decision 19.249 paragraph b) on Brazilwood (*Paubrasilia echinata*) of the 19th meeting of the CITES Conference of the Parties (CoP19, Panama City, 2022).

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CONTENTS

EXECUTIVE SUMMARY

Paubrasilia echinata (Brazilwood, pernambuco, pau-brasil) is a tree species endemic to Brazil, where it is also the national tree. The size of *P. echinata's* native populations have been reduced by logging for wood, by agriculture and forestry activities and deforestation for urban development under the last 500 years. The largest populations are now found in fragmented forested areas in cocoa-cabruca agroforestry system in southern Bahia, some located in fully protected conservation areas. These populations are in rapid decline due to the accelerated transformation of cocoa plantations into pastures and selective illegal logging, also inside protected areas.

Paubrasilia echinata is listed in CITES Appendix II with annotation #10 which designates ""*All parts, derivatives and finished products, except re-export of finished musical instruments, finished musical instrument accessories and finished musical instrument parts.*"

It was originally listed under the name *Caesalpinia echinata*, which was changed to *Paubrasilia echinata* following the adoption of a new standard nomenclatural reference at the 18th meeting of the Conference of the Parties (CoP18; Geneva, 2019). The current annotation #10 of the Appendix II listing of *P. echinata* in Appendix II is the result of an amendment adopted by the Conference of the Parties its 19th meeting (CoP19; Panama City, 2022).

As a complement to this amendment to Appendix II, at CoP19 the Conference of the Parties also adopted Decisions 19.249 to 19.253 on Brazilwood (*Paubrasilia echinata*).

The Secretariat has reported progress in the implementation of these decisions to the Plants Committee at its 26th and 27th meetings (PC26 and PC27) through documents PC26 Doc. 31 and PC27 Doc. 29.

In accordance with Decision 19.249, the Secretariat undertook the present study, which is structured in three chapters in accordance with the outputs produced:

Chapter 1: Options towards the establishment of a traceability system for *Paubrasilia echinata* bows.

This is in support of the implementation of paragraphs a) and b) of Decision 19.249 and includes, *inter alia*, an analysis of the relevant aspects of the responses received to the Notification to the Parties No. 2023/033, as contained in Annex 2 to document PC26 Doc. 31.

Chapter 2: Analysis of cross-cutting matters relevant to the implementation of Decisions 19.250 to 19.253, including enforcement, stockpile management and capacity-building needs; and

Chapter 3: Reflections towards an improved implementation of the Appendix II listing of *Paubrasilia echinata.*

Each chapter unpacks specific aspects relating to challenges and opportunities, offering detailed analyses and practical recommendations, as outlined below.

The first chapter focuses on the traceability of Brazilwood bows, presenting various alternatives for developing a tracking system. These include marking individual bows, issuing certifications, and creating centralized databases. Technologies such as Near-Infrared Spectroscopy (NIRS), isotope analysis, and forensic methods are proposed as ways to identify the wood origin. Responses to Notification to the Parties No. 2023/033 reveal that while Parties adopt different approaches, there is widespread agreement on the importance of traceability systems and the role consistent markings and certificates could play in verifying the legality and origin of the wood.

The second chapter examines cross-cutting matters relevant to the implementation of Decisions 19.250 to 19.253, including enforcement, stockpile management and capacity-building needs. The section on Legislation Enforcement and Stock Management of Brazilwood highlights efforts by various countries to combat the illegal trade of this species. In Brazil, enforcement actions by the Brazilian Institute of Environment and Renewable Natural Resources (IBAMA), in collaboration with the Federal Police, have led to significant wood seizures. However, challenges remain, such as identifying illegal stocks, which underscores the need for more robust control systems. Other Parties, such as Germany and the United

Kingdom of Great Britain and Northern Ireland, are implementing or in the process of introducing voluntary stock controls and inventories to support compliance with CITES regulations.

The third and final chapter outlines a path to enhance the implementation of the CITES Appendix II listing of *Paubrasilia echinata*. It highlights key challenges and strategies for its sustainable management and conservation. The report found that Brazilwood plantations exist but the status of these plantations and the feasibility to use these for the musical instrument industry must be confirmed by the scientific research and investments by industry of bows. The lack of a standardized global traceability system for *Paubrasilia echinata* is a challenge. Solutions include developing technologies to verify legal origins and using methods such as isotopic analysis and origin marking to regulate harvesting and commercialization of Brazilwood bows effectively. Coordinated efforts, including increase of enforcement and traceability of current stocks worldwide, between the range State (Brazil), and major importers in North America and Europe, along with private-sector involvement in conservation initiatives and trade regulations, are key to conserving the species and ensuring its legal, sustainable and traceable trade.

CHAPTER 1: OPTIONS TOWARDS THE ESTABLISHMENT OF A TRACEABILITY SYSTEM FOR *PAUBRASILIA ECHINATA* BOWS

This chapter provides a literature review of traceability systems for timber and wood specimens in trade, focusing on those that are currently utilized or could potentially prove beneficial for tracing the trade of bows made from *P. echinata*.

1.1. Introduction to Chapter 1

Brazilwood (*Paubrasilia echinata*), Brazil's national tree, holds a special significance as it lends its name to the country itself. This species is exclusively found within the Atlantic Forest biome. Beyond its ecological importance, *P. echinata* has deeply influenced Brazil's social and economic history. Dating back to 1501, collectors known as "brasileiros" exploited the dye extracted from the tree's heartwood. Additionally, its timber is highly valued for its durability and strength, being utilized in the crafting of bows for stringed instruments, construction materials, and traditional hunting tools (BGCI, 2020).

The use of Brazilwood in the music industry began in the mid-18th century, driven by its acoustic properties that yield outstanding sound quality. Currently, it is widely regarded as the best species for crafting bows for stringed musical instruments. Over 520 years of intensive exploitation, initially for dyes and later for musical instrument production, coupled with significant deforestation pressures on the biome, have resulted in the fragmentation and drastic reduction of natural populations. In several regions where the species was historically abundant, it has been severely depleted. Therefore, Brazilwood has been listed as an endangered species in the Brazilian flora since 1992 (CITES, 2022).

There is little evidence of commercial Brazilwood plantations and no documented case of a planted Brazilwood tree being successfully used in the manufacture of a musical bow. Currently, the exploitation of Brazilwood can only occur through properly registered plantation in the National System for Controlling the Origin of Forest Products (SINAFLOR) before the competent environmental agency, as sustainable management of timber species in the Atlantic Forest is prohibited by Law N°. 11,428/2006. The exploitation of these mature trees from the middle, advanced and primary stages of the Atlantic Forest is also prohibited by Federal Decree 750/1993.

An article published by Valor Econômico magazine in June 2023 highlighted one of the largest commercial Brazilwood planting initiatives, funded by the International Pernambuco Conservation Initiative (IPCI), an organization that brings together bow makers from 24 countries. According to the article, IPCI invested in planting 340,800 seedlings between the early 2000s and 2013, mainly in states of Bahia, Pernambuco, Paraíba, and Rio Grande do Norte. However, the Brazilian Institute of Environment and Renewable Natural Resources (IBAMA) warns of gaps in the management of these plantations, noting that until now none of them has been registered with the SINAFLOR, which is an essential step for possible future management plans and possible use of planted trees to manufacture the bows.

To strengthen efforts in the conservation of Brazilwood and the promotion of its sustainable use, IBAMA published Ordinance N°. 1992 of 20 July 2022 which established the Working Group (WG) responsible for developing the National Strategy for the Protection of *P. echinata*. The WG is dedicated to various activities, including regulation review, establishment of criteria for authorization and inspection, assessment of timber stockpiles, allocation of seized material, and development of field materials, among others.

The establishment of the WG was prompted after the compilation of the results of five years of the Operation Dó-Ré-Mi, the audit works of SINAFLOR, and the Forest Origin Document (DOF), which exposed a series of frauds in the bow making sector in Brazil. These investigations resulted in the seizure of over 290 thousand Brazilwood blanks, as well as more than 395 logs. In 2021 & 2022, Federal Police investigated more than 45 actors involved in the illegal exploitation of *Paubrasilia echinata* (PF, 2022).

Evidence was uncovered indicating the existence of a criminal association involving extractors, transporters, intermediaries, brokers, bow makers, and companies producing and exporting stringed instrument accessories. The criminal activity involved processing illegally extracted Brazilwood from Federal Conservation Units, especially from the Pau-Brasil National Park, with the aim of selling the finished product in the form of violin/bass bows, or even as sticks (unfinished product) abroad, without

any control by Brazilian authorities, circumventing the inspection channels of the Federal Revenue Service and IBAMA (PF, 2022).

Once the blanks arrive abroad, it becomes virtually impossible to differentiate the product manufactured by recent illegal deforestation from those that were produced from pre-Convention traded blanks.

1.2. Background on Brazil's national legislation where relevant to *Paubrasilia echinata*

The main regulations related to the export of timber products and byproducts originating from natural or planted forests, are presented below.

A. Historical evolution of legal framework

The need to regulate the use of forest resources in Brazil has been on the agenda since the colonial period. Since then, Brazilian legislation on the subject has undergone various revisions and improvements, seeking to keep up with the demands and challenges of forest management.

The following table presents a historical overview of the evolution of legislation relevant to the use and trade of forest resources in the country, highlighting the main regulatory milestones that have shaped the way forests are exploited and preserved.

Table 1. Key Milestones in Brazilian Forest Legislation

YEAR	DOCUMENT	DESCRIPTION
1605	Rules of Procedure on Pau Brasil	This regulation required express royal authorization for the cutting of Brazilwood trees, in addition to imposing other limitations on the exploitation of this tree species (Revoked)
1799	Regulation on Wood Cutting	Rules for felling trees, in addition to other restrictions provided therein (Revoked)
1934	Decree No. 2,793, of January 23, 1934	1st Forest Code (Revoked)
1965	Federal Law No. 4,771, of September 15, 1965	2nd Forest Code (Revoked)
1978	Federal Law No. 6,607 of December 7, 1978	Declares Brazilwood as the national tree and determines the promotion of campaign on the importance of the species in Brazilian history and the promotion of the establishment of Pau-Brasil seedling nurseries throughout the country, for their conservation and distribution for civic purposes.
1992	IBAMA Ordinance No 37-N, of April 3rd, 1992	Recognizes the species on the official list of endangered flora species
1993	Federal Decree No 750 of December 10, 1993	The cutting, exploitation and suppression of primary vegetation or vegetation in the advanced and medium stages of regeneration of the Atlantic Forest are prohibited.
2000	Decree No. 3,607, of September 21, 2000	Provides for the implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)
2001	Resolution CONAMA No. 278, of August 30, 2001	Provides for the prohibition of the cutting and exploitation of endangered species of the Atlantic Forest flora in Brazil.
2002	Resolution CONAMA No 300, of March 20, 2002	Complements the cases subject to cutting authorization foreseen in art. 2º of CONAMA Resolution nº 278, of May 24, 2001.

YEAR	DOCUMENT	DESCRIPTION
2002	Resolution No 317 of December 4th, 2002	Establishes the criteria necessary for genetic conservation and sustainability of the exploitation of endangered flora species in the Atlantic Forest
2006	MMA Ordinance No. 253, of August 18, 2006	Establishes the forest origin document (DOF) in replacement of the authorization for the transport of forest products (ATPF)
2006	IBAMA Normative Instruction No. 140, of December 18, 2006	Establishes the service for requesting and issuing IBAMA permits for the import, export and re-export of specimens, products and byproducts of Brazilian wild fauna and flora, and of exotic fauna and flora, whether or not included in the annexes of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).
2006	Federal Law No. 11,428, of December 22, 2006	Provides for the use and protection of the native vegetation of the Atlantic Forest Biome
2007	CITES Appendix II	Brazilwood included in CITES Appendix II (CITES CoP14, 2007) with annotation #10. Originally listed as *Caesalpinia echinata*, which became a synonym of *Paubrasilia echinata* in 2019 following taxonomic changes adopted at CoP18 (see document CoP18 Doc. 99).
2008	MMA Normative Instruction No 6, of September 23, 2008	Maintains the species on the official list of endangered flora species
2012	Federal Law No. 12,651, of May 25, 2012	New Forest Code. Provides for the protection of native vegetation. It establishes general rules on the protection of vegetation, Permanent Preservation Areas and Legal Reserve areas; forest exploitation, the supply of forest raw materials, the control of the origin of forest products, among others.
2014	MMA Ordinance No. 443, December 17, 2014	*P. echinata* is listed as threatened of extinction in Brazil, classified under the IUCN criteria as Endangered (EN). It imposes full protection for species in the categories Extinct in the Wild (EW), Critically Endangered (CR), Endangered (EN), and Vulnerable (VU), including prohibition of collection, harvesting, transportation, storage, handling, processing, and commercialization, among others.
2014	Normative Instruction No. 21, of December 24, 2014	Establishes SINAFLOR with the purpose of controlling the origin of wood, charcoal and other forest products and byproducts and integrating the respective data of the different states.
2021	Normative Instruction No. 17, of December 1, 2021	Provides for access to information on products and waste subject to environmental control by IBAMA in import and export operations
2022	Normative Instruction No. 8, of March 25, 2022	Establishes the procedures for authorizing the export of wood products and byproducts of native species from natural or planted forests, to complement, IBAMA´s control of the export of shipments native timber.

YEAR	DOCUMENT	DESCRIPTION
2022	CITES Appendix II, amendment to Annotation #10	At CITES CoP19 (Panama City, 2022) the Annotation #10 for *Paubrasilia echinata* was amended as follows: *"All parts, derivatives and finished products, except re-export of finished musical instruments, finished musical instrument accessories and finished musical instrument parts."* See also Notification to the Parties 2023/005.

B. MMA Ordinance No. 253, of August 18, 2006

The Forest Origin Document (DOF), established by Ordinance No. 253/2006, from the Ministry of the Environment (MMA), is a mandatory license for the transportation and storage of forest products from natural forests. It contains information about the origin of the products, as provided for in Article 36 of Law No. 12,651/2012 (Brazil Forest Code).

The criteria and procedures for the use of the DOF are governed by Normative Instruction IBAMA No. 21/2014, amended by Normative Instruction IBAMA No. 9 of December 12, 2016 (IN IBAMA No. 9/2016), valid for all Brazilian states that use it.

On December 5, 2022, the DOF+ Traceability System came into effect as an enhanced tool for issuing, managing, and monitoring the DOF for native forest products of Brazil. It introduced traceability mechanisms, such as the tracking code generated by the authorization number (Autex) from SINAFLOR, to identify the origin of the products. Authorizations issued before this date continue to use the DOF, following the rules of IBAMA Normative Instruction No. 21/2014.

C. IBAMA Normative Instruction No. 21, of December 23, 2014

Normative Instruction No. 21/2014, issued by IBAMA, establishes the National System for Controlling the Origin of Forest Products (SINAFLOR) with the aim of controlling the origin of wood, charcoal and other forest products and byproducts and integrating the respective data from the different states. The system allows for the registration and issuance of the DOF, as well as monitoring the production chain from extraction to product commercialization, contributing to combating illegal deforestation and unsustainable exploitation of forest resources.

The Forest Origin Document (DOF), established by MMA Ordinance No. 253/2006, constitutes a mandatory license for the transportation and storage of forest products of native origin, including native charcoal, containing information about the provenance of these products. It establishes specific requirements to ensure access to the DOF and regulate the circulation of these products. The DOF is a legal requirement for private individuals or legal entities involved in activities related to natural resources, especially the use and transportation of forest products.

To request the DOF, it is necessary to meet certain requirements. First, to be registered in the Federal Technical Registry of Potentially Polluting Activities and/or Users of Environmental Resources (CTF/APP) or in the Legal Environmental Registry, declaring at least one activity relevant to the DOF according to the established criteria. In addition, the applicant must be in good standing with IBAMA, which is verified through the issuance of the IBAMA Certificate of Regularity (CR).

Regulation defines the forest products that are subject to control and require the issuance of the DOF for their transportation. Such products can be classified into two categories: raw forest product and processed forest product. The former includes items such as roundwood, firewood, while the latter includes products resulting from processing activities, such as sawn wood, veneer, charcoal, woodchips, among others.

Various activities are considered relevant to the DOF, from the wood industry to the use of natural resources. This encompasses everything from the economic exploitation of timber to the transportation

and trade of forest products. All of these activities are subject to environmental control and monitoring, aiming to ensure the sustainability of forest resources and compliance with environmental legislation.

From May 2, 2018, no DOF will be issued if the authorization has not been granted by SINAFLOR or integrated systems, as established in the normative instruction. To issue the DOF, the entrepreneur or holder of the authorization should make the cutting declaration in SINAFLOR, informing the volumes and products exploited. This step is essential to ensure the traceability and legality of forest products.

D. IBAMA Normative Instruction No. 8 (25 March 2022)

Normative Instruction IBAMA No. 8/2022 establishes procedures for the authorization of export of native species timber products and byproducts originating from natural or planted forests. The purpose of this regulation is to complement the control of native timber exportation under IBAMA's jurisdiction. To achieve this, it draws upon Normative Instruction No. 21/2014, which establishes the SINAFLOR, Normative Instruction No. 17, of December 1, 2021, which deals with access to information on products and waste subject to environmental control by IBAMA in import and export operations, and Ordinance No. 8, of January 3, 2022, which establishes the Single Agreement Platform of Brazil – PAU Brasil for use in foreign trade activities involving biodiversity products and byproducts.

The technical reference used in this Normative Instruction is the study of Brazilian flora species from the *Reflora Program*, conducted by the Rio de Janeiro Botanical Garden Research Institute - JBRJ, a federal agency integrated into the National System of the Environment (SISNAMA), and established as the CITES Scientific Authority.

The authorization for the exportation of native timber products and byproducts, subject to control within national territory, is carried out by the IBAMA Unit that has jurisdiction over the customs warehouse. This authorization must be requested through the Licenses, Permissions, Certificates, and Other Documents (LPCO-Export) module of the Single Foreign Trade Portal - PUCOMEX of the Foreign Trade Systems (SISCOMEX). The authorization of the cargo to be exported begins with the issuance of the Forest Origin Document - DOF Exportation, or similar state document, through the respective federal or state system integrated with it, as a mandatory prior step to LPCO authorization.

For cargoes containing finished, packaged, manufactured, or for final consumption products of specimens of species listed in the CITES Appendices, the request for CITES license issuance must be made directly by the applicant to the SISCITES - CITES and Non-CITES License Issuance System, as a prior and complementary requirement to LPCO authorization. In the case of cargoes that do not contain species listed in the CITES Annexes, authorization provided via LPCO and DOF -Exportation exempts the need for another formal authorizing act.

To obtain the export permit, the exporter must provide the Regularity Certificate in the exporter category in the Federal Technical Registry (CTF); Exportation Origin Document (DOF), Exportation Forest Guide (GF), or similar authorization for forest product transportation, adopted by the competent environmental agency. Additionally, it is necessary to present the fiscal document (invoice), the goods list or packing list, containing at least the information listed in Annex I of this Normative Instruction, with detailed breakdown of bundles or pallets when applicable. Certificate or license for species listed in the annexes of CITES, when applicable, must also be provided.

The origin of timber products and byproducts such as sawn timber and timber with a thickness above 250 mm must be proven with an indication of the Sustainable Forest Management Plan (SFMP) or plantation exploitation with native species, duly approved by the competent environmental authority. It is necessary to present transportation documents that allow the identification of all stages of the production chain, from the forest to exportation.

The exportation of timber products and byproducts of species listed in official lists of endangered species is allowed only when originating from Sustainable Forest Management Plans or plantation forests of native species, duly approved by the competent environmental authority. In these cases, it is necessary to present the Forest Exploitation Authorization - AUTEX or Forest Exploitation Authorization - AUTEF, or similar document, in addition to transportation documents that allow the identification of all stages of the production chain, from the forest to the exportation.

Timber products and byproducts subject to export authorization by IBAMA are subject to inspection by sampling in the retro-area, or along the storage and transportation route indicated in the DOF or GF

Exportation, verifying items such as volume; species (scientific name), products, with their respective degree of industrialization, and batch mark.

E. IBAMA Technical Note No. 4/2020/DBFLO

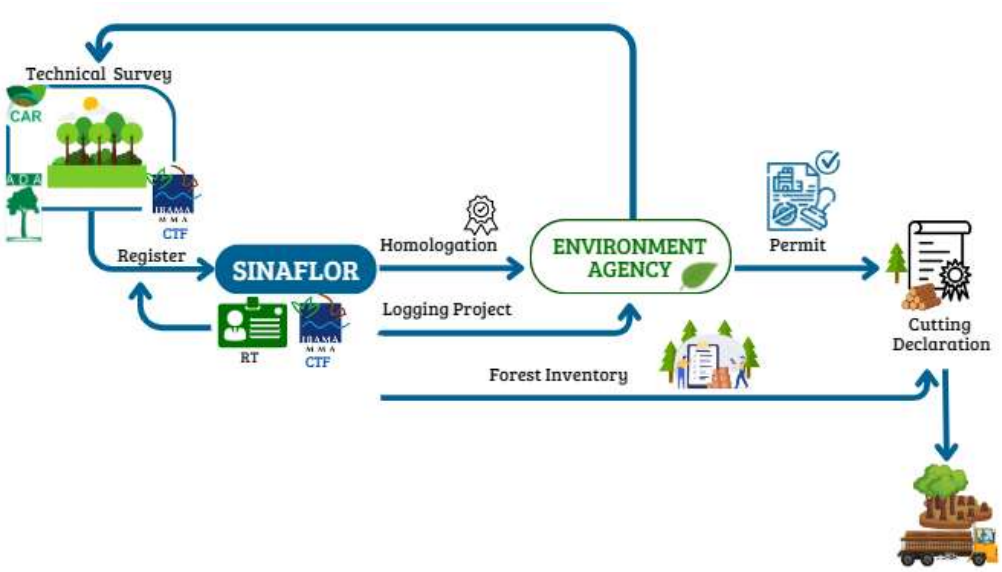
This technical note (No. 4/2020) explains in detail the mechanism how the timber species control works in the Brazilian system. The DOF for Exportation, or equivalent state document, is the license required by article 37 of Law 12,651/12 for the customs clearance of native forest species products and byproducts. In three specific cases, the legislation imposes additional requirements: species listed in CITES require the issuance of a CITES License; products and byproducts of species included in official lists of endangered species and/or falling under article 3 of IBAMA Normative Instruction No. 8/2022 requires an Export Authorization issued by IBAMA.

The first stage involves procedures for the registration of rural properties, entrepreneurs, and technical responsible parties in the cadastral control and management systems: Federal Technical Registry (CTF), Environmental Declaratory Act (ADA), and Rural Environmental Registry (CAR).

The subsequent phase, carried out by SINAFLOR, includes the description and approval of the area to be exploited on the rural property); presentation, analysis, and licensing of logging projects; and authorization of the cutting declaration (Figure 1).

The evolving stage encompasses all transactions related to storage, transportation, processing, and destination within national territory, recorded in the Forest Resources Utilization Module of the DOF.

Figure 1. Main processes related to registration in the Registry Control

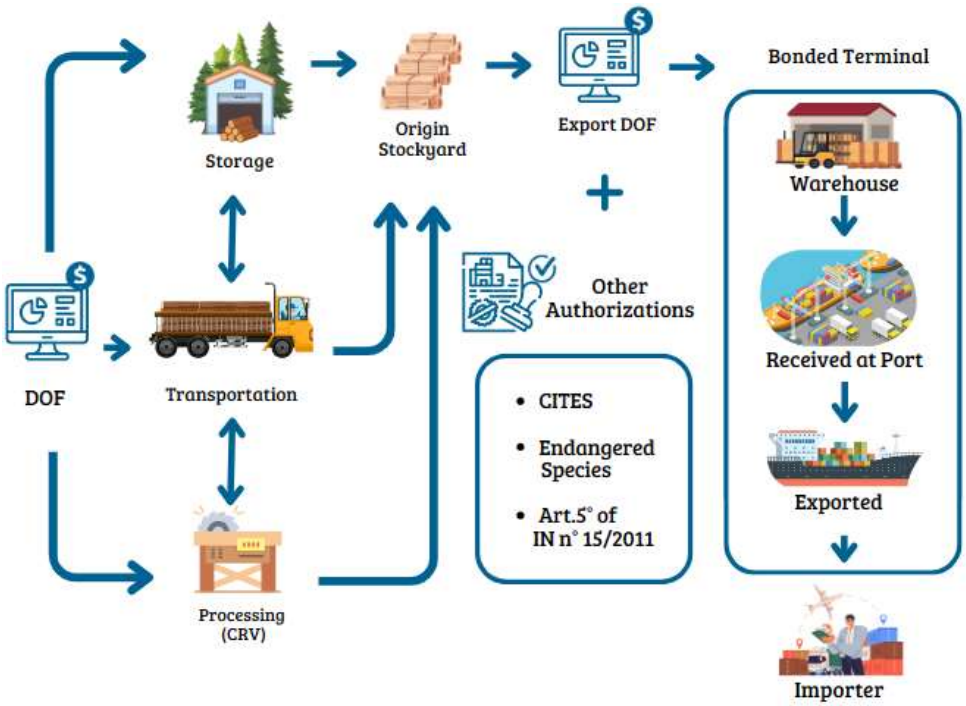


Source: IBAMA (2020).

Foreign trade, carried out through the DOF Exportation module, encompasses all movement between the cargo's origin yard and the customs terminal; storage and transportation at the customs terminal;

customs clearance; and the internationalization of the cargo with subsequent export declaration (Figure 2).

Figure 2. Main processes related to the transport and storage of forest



Source: IBAMA (2020)

The control systems for forest products continue to evolve with IBAMA's development of the Single Authorization Platform of Brazil (PAU-Brasil). This solution allows all activities involving the foreign trade of Brazilian biodiversity products and byproducts to undergo risk analysis and management prior to license issuance, integrated into the SISCOMEX.

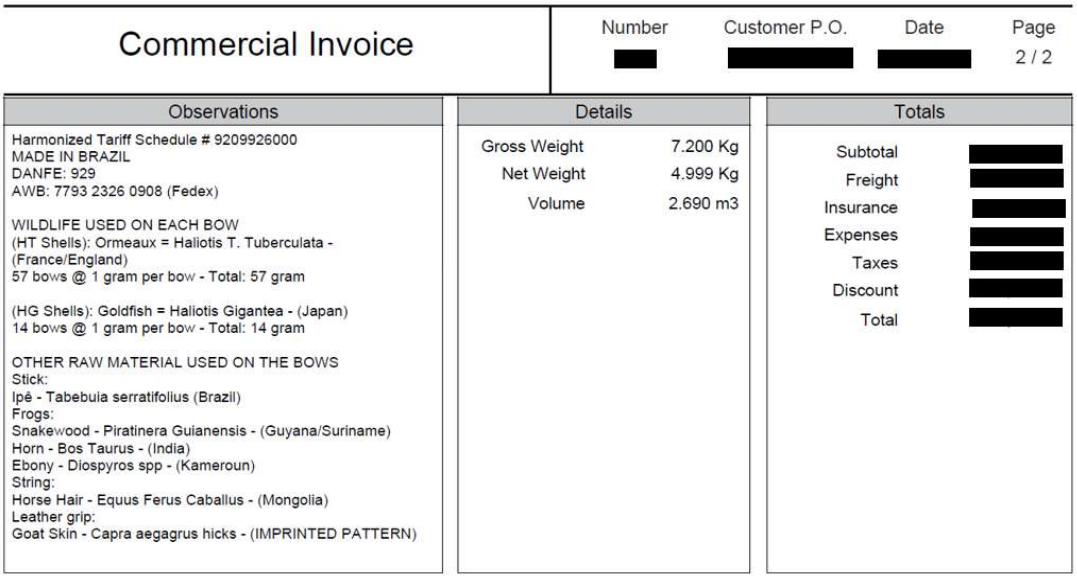
The DOF+ Traceability System (IN no. 16 of November 25/2022) is the main tool for managing the chain of custody of timber and forest products in Brazil. It enables the electronic registration and monitoring of activities related to the management, transportation, and commercialization of forest products.

For exporting violin bows, specific documents are required to ensure traceability and legal compliance, such as the invoice, packing list, destination statement and the origin of the wood, which must be registered in the DOF system.

The invoice details the commercialized product, including information such as the quantity, model, and brand of each bow. The invoice used in international transactions, known as the commercial invoice, provides the same information in English. In addition, all materials used in the production of bows are described in the document such as the origin of stick, specification of frog, gripping and string (horse hair), and others (Figure 3). The packing list includes data about the packaging and product characteristics, such as the total number of items, markings on the packages, identification of packages by numerical order, and the type of packaging (box, pallet, etc.), along with net weight, gross weight, unit

dimensions, and the total volume of the shipment. The destination statement is a document that records the total volume of wood, expressed in cubic meters, leaving the company's virtual yard.

Figure 3. Manufacturer/Product Identification Control in Brazil



Commercial Invoice

Number	Customer P.O.	Date	Page
[redacted]	[redacted]	[redacted]	2 / 2

Observations

Harmonized Tariff Schedule # 9209926000
MADE IN BRAZIL
DANFE: 929
AWB: 7793 2326 0908 (Fedex)

WILDLIFE USED ON EACH BOW
(HT Shells): Ormeaux = Haliotis T. Tuberculata - (France/England)
57 bows @ 1 gram per bow - Total: 57 gram

(HG Shells): Goldfish = Haliotis Gigantea - (Japan)
14 bows @ 1 gram per bow - Total: 14 gram

OTHER RAW MATERIAL USED ON THE BOWS
Stick:
Ipé - Tabebuia serratifolius (Brazil)
Frogs:
Snakewood - Piratinera Guianensis - (Guyana/Suriname)
Horn - Bos Taurus - (India)
Ebony - Diospyros spp - (Kameroun)
String:
Horse Hair - Equus Ferus Caballus - (Mongolia)
Leather grip:
Goat Skin - Capra aegagrus hicks - (IMPRINTED PATTERN)

Details

Gross Weight	7.200 Kg
Net Weight	4.999 Kg
Volume	2.690 m3

Totals

Subtotal	[redacted]
Freight	[redacted]
Insurance	[redacted]
Expenses	[redacted]
Taxes	[redacted]
Discount	[redacted]
Total	[redacted]

Additionally, an exporting company must be duly registered with the Federal Technical Registry (CTF) as an exporter and have a CTF 'certificate of regularity' (i.e. certificate of compliance)

At the time of export, the wood volume is reconverted into cubic meters, reducing the total amount recorded in the virtual yard.

In the destination country, such as the United States, the product buyer must complete the Lacey Act Form, required by import authorities. This form provides information about the product´s origin and specifications, safeguarding both the supplier and the buyer from potential violations related to illegal timber trade.

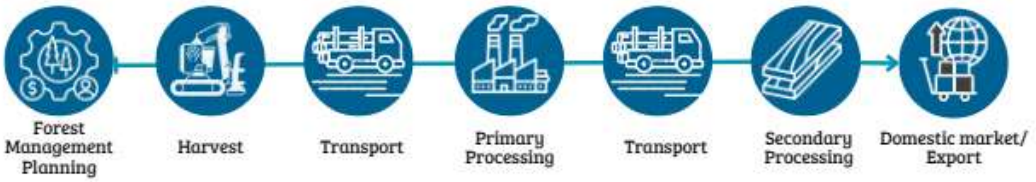
In certain countries, such as Germany and the Czechia, environmental authorities issue documents that include an individual technical sheet for each violin bow. This form of control is particularly applied to professional bows, aiming to facilitate their identification and the issuance of certificates or documentation provided by the artisan, thereby ensuring the product's value and authenticity.

1.3. Timber traceability systems

Traceability serves as a tool that allows tracing the track of wood throughout its production chain and trade, from its origin to the end consumer. This monitoring capability facilitates the assessment of risks associated with illegal logging and compliance with environmental regulations. However, it should be noted that a traceable product does not automatically imply its legality or sustainability. Ultimately, traceability contributes to the accountability of the various actors involved in the supply chain (Figure 4), offering consumers and regulators greater confidence regarding the origin and processes applied to forest products.

Traceability systems managed by governments differ from those developed by private entities and civil society, such as chain of custody certifications. While voluntary systems tend to be more flexible and tailored to market demands, government systems are defined by geographic and jurisdictional boundaries, often involving the application of legal sanctions in cases of non-compliance.

Figure 4. Generic forest sector supply chain

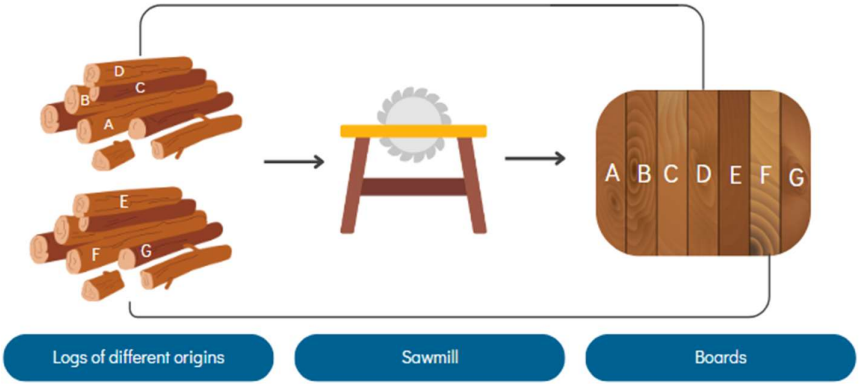


Source: Adapted from World Resources Institute (2023).

In this context, traceability managed by the public authority is essential for integrating national and subnational data, encompassing a broader scope of monitoring, unlike private systems, which generally focus on specific customer chains.

The concept of traceability can be categorized into different levels, ranging from identity preservation (Figure 5), where the product is traced back to its specific origin, to volume monitoring, which is more practical but has limitations in ensuring the exact provenance of each unit of wood.

Figure 5. Identity preserved in sawnwood production



Source: Adapted from World Resources Institute (2023).

“Identity preservation”, which allows each product to be traced back to its tree of origin, is the highest level of traceability, providing detailed control over provenance (Figure 5). However, the application of this method faces significant challenges, such as high costs and complexity of maintaining the separation of materials during processes such as sawmilling, where different batches of wood are often mixed together. Adopting this model on a large scale would be impractical due to the need to assign unique identifiers to each individual piece of wood, which increases costs and operational complexity.

On the other hand, volume tracking or “mass balance” is a more viable alternative for complex supply chains where identity preservation is not practical or necessary. This system allows for monitoring and reconciling the volume of inputs and outputs throughout the production chain, ensuring that the total amount of wood extracted and processed aligns with the reports.

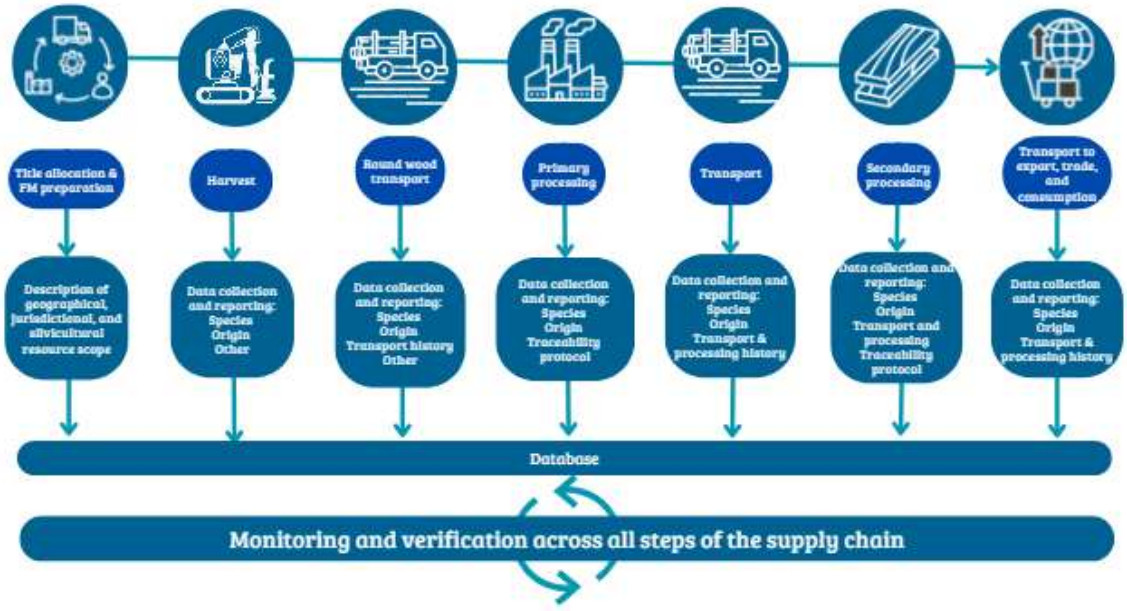
The choice of the adequate level of traceability depends not only on the type of product but also on the complexity of the supply chain. High-value products, such as tropical woods destined for the manufacture of musical instruments, often require strict identity preservation, which can be technically challenging and economically costly. On the other hand, volume tracking allows for reconciling inputs and outputs along the chain, offering a plausible verification of legality but not guaranteeing the exact origin of each unit.

However, the effectiveness of a traceability system also depends on how information is captured, stored, and managed. The use of emerging technologies, such as geolocation systems and mobile applications

for data collection and monitoring, has the potential to totally transform the quality of these systems. Centralized data management is key to overcoming the limitations of paper-based systems, which lack reliability and transparency (Figure 6).

In many jurisdictions, weak governance and endemic corruption can undermine the functioning of these systems, allowing falsified data to enter the platform undetected. That emphasizes the need for a strong regulatory framework that includes monitoring and auditing mechanisms, along with strict sanctions for non-compliance.

Figure 6. Generic supply chain and data collected to monitor material flow



Source: Adapted from World Resources Institute (2023).

Although the confidentiality of commercial data is a legitimate concern for companies, the partial opening up of traceability information can be a determining factor in increasing trust in the system among buyers and civil society. The use of emerging technologies, such as blockchain, has been discussed as a possible solution to ensure data integrity and enable distributed control of information. However, the application of blockchain in forest supply chains is still in its early stages, with few completed pilot projects or publicly accessible for evaluation.

The success of a wood traceability system depends on a careful balance between technology, governance, and encouraging compliance. Effective traceability systems not only facilitate compliance with laws, but also create a framework where compliance is the most rational and advantageous choice for all actors in the supply chain. Through a combination of technological advancements, robust governance, and transparency, it is possible to build a system that significantly contributes to legality, sustainability, and forest protection.

1.4. Science-based traceability resources relevant to *Paubrasilia echinata* bows

Accurate and precise identification of the wood-producing species and its geographical origin is fundamentally important for demonstrating compliance with laws, ensuring supply chain integrity, and controlling illegal logging practices. Several scientific methods are currently used to determine the origin

of timber, including NIRS technology, isotopic analysis, and forensic methods, which are presented below.

A. NIRS technology

Near infrared spectroscopy (NIRS) is a technique that provides fast results with minimal sample preparation. It is particularly well-suited for analyzing wood materials, including estimating the length of tracheids, verifying the characteristics of thermally treated wood, predicting decay resistance, and estimating chemical composition. NIRS is also useful for detecting inorganic preservatives and estimating the mechanical properties of wood logs, wood composites, and for monitoring the condition of in-service wood structures (Pastore et al., 2011).

Kunze et al. (2023) demonstrated the effectiveness of NIR spectroscopy. They tracked a shipment of *Cedrela odorata* L. boards from a legal extraction area in the Jamari National Forest (Amazon) to a dealer in Ubatuba (São Paulo). NIR spectra were obtained at the origin and used to create a data-driven soft independent modelling by class analogy (DD-SIMCA) model. Applying this model to spectra collected at the destination revealed a 76.2% probability that the analyzed cedar cargo was indeed the same as the one analyzed at the logging site.

Novaes et al. (2022) investigated the potential of NIR technology to identify wood species in Amazonian forests. They achieved this by developing multivariate models that analyze the spectral signatures of wood specimens processed by circular saws and chainsaws. The researchers assessed the impact of processing type on the quality of information collected from wood surfaces. The results demonstrated that partial least squares-discriminant analysis (PLS-DA) models built using spectral signatures from circular saw-processed wood surfaces achieved a significantly higher percentage of correct classifications (99.2%) compared to models based on chainsaw-processed wood surfaces (95.2%).

B. Isotopes

Isotopes can be used to track the origin of wood accurately. Each region has a unique isotopic signature, which is reflected in the composition of isotopes present in water and soil. This signature is then absorbed by plants during growth. By analyzing the isotopes present in wood, scientists can identify the geographical area from which it was extracted.

Often, law enforcement efforts to curb illegal trade in timber and wood products are often hampered by a lack of available tools to verify the wood origin. Boeschoten et al. (2023) are currently testing the stable isotope forensic method to investigate isotopic variation in two economically important woods. However, the results indicated limited potential to trace origin based on stable isotope ratios. While isotopic composition may hold more promise at larger scales, such as between countries or in other regions, in the area where the study was conducted, regional variation was not sufficiently strong to identify subnational origin, as individual sites already exhibited high local variability in isotopic composition.

During the Ibirapitanga Operation, the Federal Police conducted stable isotopes analysis to separate logs from plantations and logs from native/wild origins. This method was also applied to determine the origin of confiscated bow blanks and finished bows.

C. Forensic methods

The concept of species has evolved from a definition primarily based on morphology to a more integrated view that considers evolutionary lineages at the population level. This shift has led to the need to use multiple lines of evidence, including genetics, to delimit species more accurately and avoid overestimating biodiversity. Forensic methods utilize molecular methods, such as DNA barcoding, are becoming popular due to the availability of genetic data at low prices, although delimitation based on a single locus can be problematic due to confusion in the phylogenetic signal. However, there are various methods, such as Automatic Barcode Gap Discovery (ABGD), Assemble Species by Automatic Partition (ASAP), and Generalized Mixed Yule Coalescent (GMYC), that offer innovative approaches to tackle this challenge, using different strategies to define species boundaries based on genetic data. Additionally, the use of multilocus data, as in the Stacey method, has become common to improve the accuracy of species delimitation. In this context, the use of DNA sequence markers can be especially helpful in

resolving identification issues in genera like Dalbergia, which present morphological complications and are subject to illegal trade (HERRERA SOSA et al., 2016).

D. Electrospray Ionization Mass Spectrometry method

The Electrospray Ionization Mass Spectrometry method (ESI-MS) is being developed by INMETRO, to characterize wood species by analyzing phytochemical markers. This technique identifies molecular profiles specific to the genus, species, and geographic origin of wood. Initially focused on differentiating native Brazilian and African mahogany, the project expanded to other species due to its simplicity and reduced operator training requirements compared to anatomical methods (FASCIOTTI, 2015).

A collaboration with the Brazilian Forest Service and the Federal Rural University of Rio de Janeiro revealed differences between samples from natural forests and plantations of Brazilwood. The project now aims to build a comprehensive database of molecular profiles from both sources, considering geographic influences, to develop a reliable tool for combating illegal trade in Brazilwood, usable both in laboratories and the field.

1.5. Summary of responses to the Notification to the Parties No. 2023/033 and 2025/076 where they relate to traceability

In accordance with paragraph a) of Decision 19.249, on 22 March 2023 the Secretariat published Notification to the Parties No. 2023/033. The Notification was addressed to Parties and stakeholders mentioned in Decisions 19.251 and 19.252 and included a questionnaire on *Paubrasilia echinata* requesting information relevant to Decisions 19.249 to 19.253. The responses to the notification, as received, are available in Annex 2 to document PC26 Doc. 31. The Secretariat published Notification to the Parties No. 20225/076 at the request of Brazil on 16 June 2025. The Notification included information shared by Brazil relating to *P. echinata* and Brazil invited Parties to share information relating to existing stocks of bows and bow blanks; strengthen enforcement relating to trade in bows and research into sustainable alternatives to Brazilwood. Where relevant, the responses received were integrated in the report.

The present section summarizes the responses received where they relate to traceability. Other crosscutting matters (beyond traceability) of the responses are covered in Chapter 2 of the present report.

In the analysis of Notification to the Parties No. 2023/033, a diversified range of approaches and efforts among different countries and organizations regarding the traceability systems related to the trade of Brazilwood bows (*Paubrasilia echinata*) is shown. Below is an evaluation of the traceability systems indicated by the respondents in the questionnaire.

A. Austria

Austria demonstrates awareness of a traceability system for *P. echinata* bows, specifically for produced bows, which are marked with serial numbers. Manufacturers also provide a certificate to the buyer with information about the origin of the bow. They consider key elements of a traceability system to include proper marking of the bows, accompanied by adequate manufacturer accounting, and the transfer of crucial origin information to the buyer.

The Austrian government notes that traceability of newly produced bows is relatively simple, but permanently marking old bows can be challenging. Regarding enforcement, there are no specific enforcement actions for *P. echinata* in Austria, and there have been no recent seizures.

B. Brazil

IBAMA is unaware of a specific traceability system for monitoring the trade of *P. echinata* bows, while highlighting key elements for a traceability system for *P. echinata* bows, emphasizing the importance of knowing the origin of the wood used in bow manufacturing and the date when the wood was extracted from the forest to verify the possibility of considering it as pre-conventional material. The institute

mentions the use of isotope testing to identify the wood's origin but notes the difficulty in determining when the wood was extracted from the forest.

Regarding the implementation of decisions on Brazilwood, IBAMA highlights efforts made in the past five years to uncover fraud in the marquetry sector but emphasizes the importance of collaboration with CITES authorities of importing countries to prevent the entry of wood of dubious origin into their countries.

C. Canada

The Government of Canada indicates that there is no knowledge of any existing traceability system for *P. echinata* bows but highlights the importance of a standardized and non-destructive method, along with a centralized database accessible to all stakeholders, as key elements for an effective traceability system.

Canada emphasizes the importance of traceability measures and capacity building to support the implementation of CITES regulations related to Brazilwood and to combat illegal wildlife trade.

D. Czechia

Czechia demonstrates proactive efforts in implementing a traceability system for *P. echinata* bows. They have recently launched a voluntary traceability system specifically for *P. echinata* bows, started in 2023. This system includes recommendations for bow makers to identify their bows using unique markings specified in certificates accompanying the produced bows. The key elements highlighted for a traceability system include the ability to prove the legal origin of *Paubrasilia echinata* bows based on manufacturer determination, along with stockpile registration and regular updates to verify legal origin.

E. Germany

Germany has established a comprehensive traceability system for *P. echinata* bows, covering acquisition, production, and transportation. This system includes special records mandated for all commercial operations, enabling tracing of specimens from acquisition to sale. Recent developments in bow marking include the application of brand marks by some bow makers, facilitating identification and traceability.

Key elements of Germany's traceability system include the development of proof of legal acquisition by the German bow makers' association. This proof, provided to buyers, enables seamless traceability. However, this measure remains voluntary in Germany.

F. Japan

Japan acknowledges the existence of a traceability system for produced bows, with some manufacturers engraving production numbers and company names on the bows they make, indicating progress in marking methods.

Key elements identified for a traceability system for *P. echinata* bows emphasize reliability in identification and data management while ensuring stakeholders' involvement and avoiding burdensome processes that could discourage participation. This reflects an awareness of the delicate balance needed to establish effective traceability measures without overly burdening stakeholders.

G. Netherlands

Netherlands response indicates a moderate level of engagement in traceability efforts for *P. echinata* bows. While they are not aware of a specific traceability system for these bows, they do note the marking practices for certain musical instruments like guitars and pianos by manufacturers. Additionally, they mention hearing about one importer working on individually marking bows from IPE wood, providing buyers with certificates containing details of legal import to the EU.

Key elements identified for a traceability system include involvement from various stakeholders such as traders, producers, exporters, and importers, along with the use of unique serial numbers linked to CITES

export permits. This demonstrates an understanding of the importance of collaboration and clear identification methods in traceability efforts.

H. Slovakia

The Government of Slovakia are not aware of any existing traceability system for these bows nor any similar system for musical instrument accessories or parts. This suggests a potential gap in their current traceability practices.

I. Sweden

Sweden is not aware of any existing traceability system for these bows. However, the government are familiar with traceability systems for other musical instruments and accessories, such as guitars made from regulated wood species like rosewood. These systems typically involve labeling with serial numbers containing secret codes linked to the manufacturer. In its response to Notification to the Parties No. 2025/076, Sweden indicated that it supports the development of verification systems combined with physical marking of finished products. The Swedish experience demonstrates that successful traceability solutions must balance technical robustness with practical feasibility for small-scale manufacturers, where overly bureaucratic processes risk undermining both economic viability and cultural continuity within the craft.

The input Sweden received from manufacturers on this issue is that they are in favor of a uniform labelling solution. Sweden indicates that effective traceability requires international coordination of technical standards rather than fragmented national solutions and support the development of sustainable supply chains for the species.

J. Switzerland

Switzerland indicates that it is not aware of any traceability system specifically in place for *Paubrasilia echinata* bows, although it has a system where bow makers can register their stock of wooden parts. There is no information about recent developments in the marking of Pau Brasil bows. Switzerland emphasizes the importance of a traceability system that provides information about the origin of Pau Brasil wood.

K. United Kingdom of Great Britain and Northern Ireland

The United Kingdom is aware of traceability systems in place for acquired, produced, and transported bows, particularly in the UK, where detailed photographs and affidavits are used for certificates of authenticity, especially for antique bows. However, such systems are less common for new bows. There are also individual arrangements to maintain a verifiable chain of custody, although they are not consistent across the industry.

Regarding recent developments in the marking of Brazilwood bows, discussions have taken place in the United Kingdom about potential methods such as laser engraving, but there are no concrete plans for wide-scale adoption. The government emphasizes the importance of a traceability system backed by a comprehensive database to ensure enforcement officials can verify the legality of bows.

In its response to Notification to the Parties No. 2025/076, the United Kingdom expressed concerns regarding the practical marking of pre-Convention bows. The United Kingdom raised the following specific issues:

- **Effectiveness**: Given the scale and complexity, ensuring comprehensive and consistent marking of pre-Convention bows globally is unlikely to be achievable in practice and without consistent and uniform application of a marking scheme such a scheme would have limited utility and may provide exploitable loopholes. The UK notes that a marking scheme would be essential for the implementation of any extension of CITES controls to finished bows as otherwise any CITES documentation issued could be used interchangeably for any bow, potentially legitimising illegal trade and negating any benefits of greater CITES regulation.

- **Operational Feasibility**: The volume of items potentially subject to marking presents a substantial logistical challenge.

- **Technical Constraints**: There is a limited number of individuals with the requisite expertise to carry out such marking without risk of damage.

- **Economic Impact**: Marking may significantly reduce the value of historically and commercially important items.

The UK indicated that it is currently considering the criteria and standardisation of voluntary marking for newly produced bows and is actively engaging with industry stakeholders to understand existing practices and explore the development of a voluntary, standardised way of marking bows that bowmakers could adopt and implement independently. The UK would welcome discussions about establishing consistent global standards for the marking on newly made bows

L. United States of America

The United States is aware of traceability systems in place for acquired, produced, and transported bows, with specific mention of commercial GPS tracking devices and services available for musical instruments, accessories, and parts. Additionally, the response details the various platforms managed by IBAMA in Brazil, such as Siscites, PAU BRASIL platform and DOF+ Traceability System, for controlling the production and commercialization of wood, including *P. echinata*. These platforms facilitate licensing, monitoring, and public consultations regarding the trade and exploitation of Paubrasilia wood.

Regarding recent developments in marking Paubrasilia bows, microchips are mentioned as being installed by certain bow makers. The key elements identified for a traceability system for Pernambuco bows include accurate tracking throughout the process, rigid registration and control of purchase and manufacture using *P. echinata* wood, and logging permits only in public forests under concessions.

The response concludes with information on recent legislative developments in Brazil Normative Instruction No. 8 (March 25, 2022), including the implementation of an online database by IBAMA to track wood products of Brazilwood for issuance of official documents, enhancing the ability to monitor commercial transactions in real-time.

M. Federal Guild Association

The respondent indicates that they are not aware of any specific traceability system in place for *Paubrasilia echinata* bows. However, they mention that certain manufacturers mark their instruments with identifiers, such as numbers or character combinations, for internal identification purposes.

Regarding recent developments in the marking of Pau Brazil bows, the respondent notes that bows have been marked for at least 30 years by some manufacturers with identifiers. They also mention their own database, which stores information for each bow, including bow number, type, model, dimensions, wood source, and physical properties.

The respondent highlights two key elements necessary for a traceability system for Paubrasilia bows. Firstly, the recording of Pernambuco wood stocks by the number of sticks used, as well as the registration of each newly built bow in a system that ensures unique identification and is managed by an independent organization.

N. ForestBased Solutions (FBS), LLC

FBS acknowledges the absence of a traceability system specifically for *Paubrasilia echinata* bows and emphasizes the need for such a system, particularly considering discussions with CITES management authorities and the trade. They highlight their extensive experience of 20 years in dealing with issues related to the trade of Paubrasilia wood and Brazilian rosewood.

FBS also provides information about their own traceability system, the Forest-Source program, which has been operational for 20 years and is designed to provide due diligence and traceability for musical

instruments. This system utilizes digital platforms for inventory, processing, and transporting woods used for musical instruments, demonstrating a multi-level approach to traceability.

Regarding recent developments on the marking of *P. echinata* bows, FBS suggests the development of an inventory management system for both pre-convention unfinished stocks and finished bows. They also stress the importance of inventory management, industry standards, and digital tools for capturing individual bow makers' unique codes or IDs as key elements of a traceability system for Paubrasilia bows.

FBS further highlights the need for a National Distribution Framework (NDF) and Legal Acquisition Framework (LAF) for stocks in the wild, along with practical data management systems for traceability, especially considering the global nature of luthiery and the guarded nature of bow makers.

FBS concludes by expressing their readiness to work with CITES and the private sector to develop practical traceability systems, highlighting the versatility and customization options of their Forest-Source program. They stress the importance of making necessary investments to address the conservation and trade challenges faced by CITES-listed timber species like *P. echinata*.

O. Music industry representatives (AFVM/CAFIM/CSFI/Alliance/FIM/IPCI/EILA/League/PEARLE)

The associations acknowledge the lack of a comprehensive international traceability system for *Paubrasilia echinata* bows but highlight voluntary efforts by bow makers in various countries to mark and document their bows, albeit without a generally accepted trade standard. They emphasize the need for more extensive marking and documentation, particularly for newly created bows, while also recognizing the challenges associated with marking older or antique bows without compromising their value and authenticity.

Regarding the key elements of a traceability system for *Paubrasilia echinata* bows, the associations stress the importance of national registration systems to identify existing stocks, along with efforts to strengthen Brazil's permit verification system to ensure the legality of future wood, blanks, or bows entering international markets. They also emphasize the need for broad acceptance of any traceability system across the music sector and nations.

CHAPTER 2: ANALYSIS OF CROSS-CUTTING MATTERS RELEVANT TO THE IMPLEMENTATION OF DECISIONS 19.250 TO 19.253 – ENFORCEMENT, STOCKPILE MANAGEMENT AND CAPACITY-BUILDING NEEDS

2.1. Introduction to Chapter 2

This chapter provides an analysis and summary of the responses to Notification to the Parties No. 2023/033 (as compiled in Annex 2 to document PC26 Doc. 31), and Notification to the Parties No. 2025/076 including cross-cutting matters relevant to the implementation of Decisions 19.250 to 19.253 related to enforcement, stockpile registration, capacity-building needs, as well as additional information based on interviews conducted in the framework of the study with various stakeholders involved in the use of *Paubrasilia echinata* (*P. echinata)* for bow-making. The CITES Secretariat obtained responses to the questionnaire on Brazilwood from twelve countries and three representatives or groups from the private industry, including bow making associations, an independent importer, and others.

The species *P. echinata* has several common names that vary depending on the context and use of its wood. Among the main ones are "Brazilwood," which is widely used in general; "Pernambuco wood," commonly associated with the production of bows for string instruments like violins; and "Brazilian dyewood," a historical reference to the use of the wood for extracting red dyes. In this study, the term "Pernambuco wood" has been used interchangeably with “Brazilwood” due to its relevance to the study.

The implementation of an effective traceability system is linked to enforcement capacity. Stakeholders mention the need for a system that allows regulatory authorities to efficiently verify the legality of products. The creation of a platform for analyzing applications and issuing licenses, such as the DOF (Forest Origin Document) system in Brazil, is an example of how technology can be used to monitor and manage the harvesting and trade of forest products.

The responses also address the issue of registering *P. echinata* stockpiles. Some stakeholders reported the existence of registration systems, such as the one implemented in Sweden, which cataloged pre-convention stocks. However, there is concern about the need for a complete national inventory that includes all stocks, especially considering that most of the available wood is outside Brazil. The lack of a comprehensive register can make it difficult to implement effective conservation and trade policies.

Stakeholders identified several urgent capacity-building needs to support the implementation of the listing of *P. echinata* in CITES Appendix II. The main needs include: (i) technical training; (ii) traceability and marking systems (as discussed in Chapter 1); (iii) support for Brazilian authorities in the implementation of CITES provisions for the species; (iv) awareness raising and education; and (v) development of a national forest inventory.

2.2. Enforcement

The responses to questionnaire on Brazilwood from stakeholders regarding the application and enforcement of regulations on Pernambuco wood point to a complex scenario, characterized by isolated efforts and, in many cases, a lack of effective international coordination in tackling the illegal trade of the species. The responses from the key actors involved are as follows:

A. Brazil

National Enforcement Actions: The response from Brazil, represented by the Brazilian Institute of Environment and Renewable Natural Resources (IBAMA), reflects an active approach in combating the illegal trade of Pernambuco wood. At the national level, Brazil has conducted joint operations between IBAMA and the Federal Police, focused on major companies that export Pernambuco wood. These operations have resulted in significant seizures of Pernambuco wood stocks. Details relating to enforcement operations were shared with Parties in Notification to the Parties No. 2025/076. Investigations are ongoing indicative that there is considerable complexity involved.

International Enforcement Actions: Brazil's international cooperation with the U.S. Fish and Wildlife Service and CITES authorities in Portugal reflects the global nature of the illegal trade in musical instrument bows. By collaborating with these entities, Brazil has been working to trace the provenance of wood used in musical instruments and recover stocks without legal origin. This initiative is relevant as it

directly addresses the issue of traceability, one of the major challenges in the fight against illegal timber trade.

Illegal trade: Despite these efforts, Brazil's response also highlights continued challenges, particularly regarding the traceability and inspection of products such as sticks and bows of musical instruments. The seizures of products lacking proof of legal origin suggests that, although authorities are active, there remains a significant gap in the control. This indicates the need to improve traceability systems and ensure that all products derived from Pernambuco wood can be easily identified and monitored throughout the entire supply chain.

Other information relating to enforcement: IBAMA conducts inspections on cargo at ports, especially at international airports. Additionally, the License for Forest Product and Byproduct (LPCO) started to be required in 2022, according to Normative Instruction No. 8, of March 25, 2022, which establishes procedures for the export of timber products originating from native timber species. The LPCO is required to ensure the compliance of exports with environmental regulations, being part of the Foreign Trade System (Siscomex) and requiring documents such as the Forest Origin Document (DOF) or CITES licenses to regulate the export of threatened species and ensure traceability in the production chain.

B. Canada

National enforcement actions: Canada positions itself as one of the countries with an initiative-taking and structured approach to combating illegal timber trade regarding CITES-listed species. The development of national risk assessment reports demonstrates a commitment to a precautionary strategy, enabling Canadian authorities to anticipate threats and mobilize resources efficiently. The use of risk assessment tools not only strengthens national enforcement capacities but also serves as a model for other countries seeking to improve their own illegal trade combat strategies.

International enforcement actions: Internationally, Canada plays an active role in various initiatives to combat illegal wildlife trade, including timber. Collaboration with organizations such as the Commission for Environmental Cooperation and INTERPOL reflects a multilateral approach, which is essential to addressing a problem crossing borders. By aligning its practices with international standards and contributing to broader global efforts, Canada demonstrates a commitment not only to protecting its own borders but also to the global preservation of endangered species, such as Pernambuco wood. No illegal trade reported.

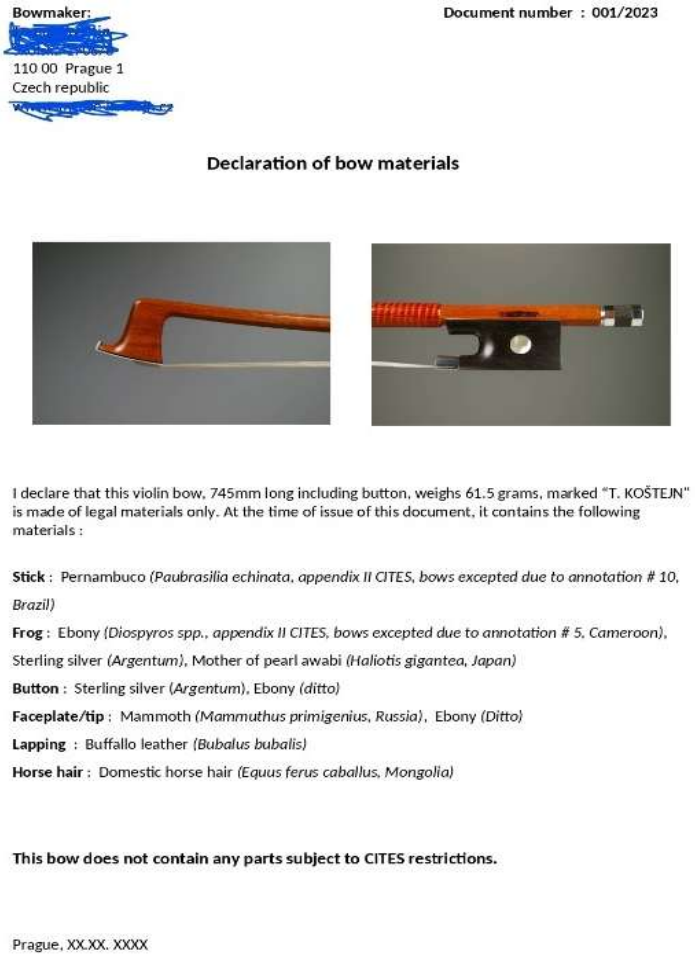
Other information relating to enforcement: Canada has significantly invested in capacity building in timber identification, developing practical field guides for use by enforcement officials. This initiative is particularly important, as accurate identification of timber species is an essential tool for combating illegal trade. The fact that Canada has extended this training to other countries, such as Tanzania, highlights its proactivity in this field and its commitment to sharing knowledge to strengthen enforcement globally.

C. Czechia

National Enforcement Actions: Czechia, through its Ministry of the Environment, presents a planned yet still early approach to monitoring the trade of Pernambuco wood. The indication of planned controls of bow makers in 2023 point out that, up to that point, there had been no targeted inspections or systematic oversight of Pernambuco wood stockpiles.

The model for declaring stocks and identifying bow manufacturers in the Czechia is detailed in Figure 7. In addition to data regarding the manufacturer, the document includes the technical specifications of the finished bow, presented through photographic records and descriptions of the materials that make up the product.

Figure 7. Manufacturer/Product Identification Register Czechia



Bowmaker:
[redacted]
110 00 Prague 1
Czech republic
[redacted]

Document number : 001/2023

Declaration of bow materials

I declare that this violin bow, 745mm long including button, weighs 61.5 grams, marked "T. KOŠTEJN" is made of legal materials only. At the time of issue of this document, it contains the following materials :

Stick : Pernambuco *(Paubrasilia echinata, appendix II CITES, bows excepted due to annotation # 10, Brazil)*

Frog : Ebony *(Diospyros spp., appendix II CITES, bows excepted due to annotation # 5, Cameroon)*, Sterling silver *(Argentum)*, Mother of pearl awabi *(Haliotis gigantea, Japan)*

Button : Sterling silver *(Argentum)*, Ebony *(ditto)*

Faceplate/tip : Mammoth *(Mammuthus primigenius, Russia)*, Ebony *(Ditto)*

Lapping : Buffallo leather *(Bubalus bubalis)*

Horse hair : Domestic horse hair *(Equus ferus caballus, Mongolia)*

This bow does not contain any parts subject to CITES restrictions.

Prague, XX.XX. XXXX

Source: Czechia, Ministry of Environment (2023).

D. Germany

National Enforcement Actions: Germany, through the Federal Agency for Nature Conservation (FANC), presents a structured control system focused on ensuring compliance with CITES regulations since the inclusion of *Paubrasilia echinata* in Appendix II. The requirement for the declaration and registration of existing stocks at that time demonstrates a commitment to transparency and rigorous tracking system of Pernambuco wood. This system has allowed Germany to keep detailed control over the movement of the species within the country, which is essential for preventing illegal trade.

The German association of bow manufacturers has developed a document to verify the legality of the product. This document is presented in detail in Figure 8. In addition to data regarding the manufacturer, the document includes the technical specifications of the finished bow, presented through photographic records and descriptions of the materials that make up the product.

Figure 8. Manufacturer/Product Identification Register Germany

Erklärung zu den Anmerkungen bei den Bogenbestandteilen.
Die Erläuterungen zu den Anmerkungen sind aus der "Liste der in CITES und der VO(EG) 338/97 geschützten Baumarten", veröffentlicht vom Bundesamt für Naturschutz, entnommen.

#5 Bezeichnet Stämme oder Holzblocke, Schnittholz und Furnierblatter
#10 Bezeichnet alle Teile, Erzeugnisse und fertigen Produkte, ausgenommen Wiederausfuhren fertiger Musikinstrumente, fertige Musikinstrumententeile sowie fertiges Musikinstrumentenzubehor.

Explanation of the annotations on the bow components.
The explanations for the annotations are taken from the "List of tree species protected in CITES and VO(EG) 338/97", published by the Federal Agency for Nature Conservation.

#5 Designates logs or wood blocks, sawn timber and veneer sheets
#10 All parts, derivatives and finished products, except re-export of finished musical instruments, finished musical instrument accessories and finished musical instrument parts.

Nachweis erstellt von - **Proof created by**:
Bogenmachermeister
XXXXXX

XXXXXXX
Germany

Ort und Datum - **Place and Date of issue**:
Erlangen, 12.12.2022

Unterschrift - **Signature**

Bogenart - **Kind of bow**:
Violinbogen - Violinbow

Stempel - **Brand**:
JOSEF P. GABRIEL

Bogen Nr. - **Bow identification no.**:
DE-A002

Nachweis der legalen Herkunft von: - **Proof of legal origin of**:
Fernambuk - **Pernambuco** - *Pau brasilia echinata*

Das Holz wurde am 11.09.2007 registriert bei: - **Wood registration on 09/11/2007 at:**
Stadt Erlangen, Amt für Umweltschutz und Energiefragen, Postfach 3160, 91051 Erlangen

Bundesinnungsverband für das Musikinstrumenten-Handwerk

Zertifikats Nr. - Certifikats No.:

AAA001

Nachweis über die verwendeten Materialien für einen Streichbogen.
Proof of the materials used for bow.

Verwendete Materialien zum Zeitpunkt der Erklärung mit Kennzeichnung der von CITES erfassten Materialien.
Materials used at the time of the decleration with identification of material covered by Cites

Pos.	Bogenbestandteile Bow components	Materialien **Materials**	CITES relevant	Anmerkung annotation
1.	Stange - **Stick**	Fernambuk - **Pernambuco** - *Pau brasilia echinata*	X	B#10
2.	Kopfplatte - **Faceplate**	Knochen - **Bone** - *Bos primigenius indicus*		
3.	Bewicklung - **Lapping**	Silber - **Silver** - *Argentum*		
4.	Leder - Leather	Ziegenleder - **Goat leather** - *Capra hircus hircus*		
5.	Frosch - **Frog**	Ebenholz - **Ebony** - *Diospyros crassiflora*	X	B#5
6.	Schub - **Slide**	Goldfisch - **Awabl** - *Haliotis gigantia*		
7.	Auge - **Eye**	Goldfisch - **Awabl** - *Haliotis gigantia*		
8.	Metall - **Metal**	Silber - **Silver** - *Argentum*		
9.	Bogenhaare - **Hair**	Pferdehaar - **Domestic Horse Hair** - *Equus ferus caballus*		

Source: Germany, Federal Agency for Nature Conservation (FANC) (2023).

International Enforcement Actions: Germany's response highlights that all imports and purchases of bows made of Pernambuco wood within the European Union shall be documented with proof of legal acquisition, and these transactions are recorded in the national accounting system. This creates a strong documentary tracking system, facilitating oversight and ensuring that the legal origin of the wood can be verified at all phases of trade. This level of rigor is essential in a context where illegal trade can easily hide among seemingly legitimate transactions.

However, the response also indicates that this control system is limited to specimens listed under CITES, which may leave gaps in monitoring materials that are not formally classified under the convention. This could represent a vulnerability in the system, especially if there is a change in the conservation status of the species or if new forms of exploitation arise that are not covered by current regulations.

International trade in Pernambuco wood is described as low volume in Germany, with authorizations issued as needed. The absence of records of illegal imports since 2007 suggests that the oversight system has been effective, but it also raises questions about the possibility of underreporting or illicit practices that may be escaping control.

E. Japan

National Enforcement Actions: Japan mentions having initiated communication with bow manufacturers about stockpiles and the traceability system, in accordance with CITES Decisions 19.251 and 19.252, but these actions are still in the early stages. The lack of concrete enforcement measures, along with the absence of international actions and evidence of illegal trade, suggests that Japan is in early stages of addressing the issue.

F. American Federation of Violin and Bow Makers (AFVM) [1]

National Enforcement Actions: The American Federation of Violin and Bow Makers (AFVM) demonstrates an awareness and support for enforcement actions related to the illegal trade of Pernambuco wood, but its direct involvement seems to be limited.

International Enforcement Actions: The organization mentions being aware of enforcement actions in Brazil and international cooperation, suggesting a careful monitoring of developments related to the species. The AFVM's activities focus on advocacy and promoting good practices within the bow-making industry.

The AFVM expresses strong condemnation of the illegal logging of Pernambuco wood and emphasizes the importance of sustainable trade for the continuity of the string instrument industry. This stance is significant because the sustainability of Pernambuco wood is directly linked to the survival of the bow making industry itself. The organization also supports the implementation of verifiable licensing systems to ensure that the products traded are of legal origin, which is an essential measure to guarantee the credibility and legality of specimens in the international market.

2.3. Registration of standing stock and stockpiles

Currently, a few *P. echinata* plantations in Brazil are registered with the competent environmental authorities, such as the state environmental agencies. In the state of Espírito Santo, for example, there is an official record with the state environmental authority the Espírito Santo Agricultural and Forestry Defense Institute - IDAF (Instituto de Defesa Agropecuária e Florestal do Espírito Santo) of two plantations identified in the framework of the present report: one with 2.52 hectares in the municipality of João Neiva and another with 8.65 hectares in the municipality of Aracruz. However, IBAMA has not received at the time the report was prepared any request for registration of such plantations in SINAFLOR.

Despite the small number of formally registered plantations, IBAMA used to conduct field inspections of commercial plantations in the state of Bahia, as evidenced by inspection reports during the period 2008 and 2012, which indicated *P. echinata* plantations on at least 9 farms.

In 2008, the need to define areas designated to *P. echinata* plantation was already emphasized, which should be organized into cultivation areas, with a formal technical project approved by the environmental agencies. At that time, IBAMA had indicated that environmental agencies could not approve such operations in the future, as there was not enough evidence that these plantations had been established through planned human intervention for commercial purposes (IBAMA 2008).

During the interviews conducted in this study, the existence of commercial plantations of *P. echinata* have been identified in various locations in the state of Espírito Santo and Bahia. The age of these plantations varies between 10 and 30 years. However, not all plantations have received the proper management needed to make them suitable for commercial use, often due to a lack of technical support in the forestry of the species. Additionally, Brazil indicated that there is no record of a bow manufactured from a planted tree even if there are plantations with proper management registered with the state environment authority (but not registered with SINAFLOR

Table 2. Record of *Paubrasilia echinata* plantations identified as of November 2024

STATE	MUNICIPALITY	FARM	# TREES
Espírito Santo	Aracruz (Guarana District)	Floriano Schaeffer	7,028*

[1] AFVM represents music industry. It submitted a collective response from the following organizations: American Federation of Violin and Bow Makers (AFVM), Confederation of European Music Industries (CAFIM), Chambre Syndicale de la Facture Instrumentale (CSFI), International Alliance of Violin and Bow Makers for Endangered Species (Alliance), International Federation of Musicians (FIM), International Pernambuco Conservation Initiative (France-Europe, Germany & USA), International Society of Violin and Bow Makers (EILA), League of American Orchestras (League), PEARLE –Live Music Europe (PEARLE).

STATE	MUNICIPALITY	FARM	# TREES
	Domingos Martins	Marco Raposo	700*
	João Neiva (Demétrio Ribeiro District)	Renato Casara	1,921*
	Jacupemba	Geraldo Bottoni	100
	João Neiva (Demétrio Ribeiro District)	Tintori	500
	Aracruz (Guarana District)	Horst John	1,200*
	Aracruz (Santa Rosa District)	Horst John	100*
	NI	Andre	30
	NI	Limão	100
	Água Branca, Alegre, Cachoeiro do Itapemirim, Conceição do Castelo, Dores do Rio Preto, Ecoporanga, Fundão, Jeronimo Monteiro, Sooretama, Santa Teresa, São Gabriel da Palha, Venda Nova do Imigrante, Viana, Vila Pavão and Vitória.		16,947
Bahia	Una Ilhéus	Maristela Nova Aurora	11,112*
TOTAL	**-**	**-**	**39,738**[1]

*Plantations registered with the state environmental authority.

Note 1: This number is estimated and considers off the record sources and yet to be surveyed. Source: Matos 2016, Espey 2020, Galveas 2024, and interview with the Horst John Company´s owner (2024).

These numbers of planted trees were self-declared by the owners, and do not represent official data from the management authority in Brazil. None of these plantations were evaluated in terms of quantity of trees, morphometry and quality of the commercial log for bow production by IBAMA.

One of the plantations in Aracruz was embargoed in 2020 by IBAMA's federal agents, after strong evidence that the virtual credits of SisDOF obtained from the authorized cutting issued by the State agency were used to launder illegally sourced wood.

In the international context, the analysis of stakeholders' responses regarding the registration of *P. echinata* stockpiles of wood presents an uneven situation in terms of the implementation of control systems. Various countries and institutions show differing levels of engagement with stockpiles registration practices, with some taking concrete actions while others remain inactive or unaware of the existence of such systems. The registration and proper traceability are fundamental to curb illegal exploitation and trade of the Brazilwood.

A. Brazil

IBAMA reveals an evolution in the registration of *P. echinata* wood stockpiles in Brazil. The country has a system for controlling the origin and transportation of timber, the DOF (Forest Origin Document), which encompasses all movements of native wood, including Pernambuco wood. However, IBAMA acknowledges that there are still challenges in verifying the legality of some wood stockpiles.

One of the most important initiatives mentioned was the creation of a Working Group (WG) within IBAMA specifically focused on Pernambuco wood. One of the WG objectives is to conduct an inventory of existing wood stocks in companies, with an emphasis on distinguishing between legally verified wood and wood that potentially lacks such verification.

Although the WG is active, it has not yet completed its activities, indicating that Brazil is in the process of implementing and structuring the registration system for Pernambuco wood stocks. The identification of wood of dubious origin and the need for a more robust inventory of stocks in Brazil, and to have registered the existing plantations and carry out technical inspections on them, are central themes for the future management of the species and for complying with CITES regulations.

B. Austria

In response to Notification to the Parties No. 2025/076, Austria indicated that registered timber is available in different forms and in different stages of the production cycle. In order to combine these into one number, Austria decided on 'bow bank' as the most relevant term and reported that an equivalent of approximately 8,000 bow blanks are registered in Austria. The majority was already registered in a voluntary register when *P. echinata* was first listed in 2007.

B. Czechia

The response from the Czechia, represented by the Ministry of the Environment, shows that the country has adopted an active stance in implementing a registration system for Pernambuco wood stocks, particularly focused on bow manufacturers. The Czech government reported that bow manufacturers have been contacted and instructed to register their Pernambuco wood stocks by the end of 2023. Furthermore, it was recommended that these manufacturers maintain and regularly update their wood stock records, demonstrating a commitment to traceability and compliance with CITES guidelines.

C. Germany

Germany provided a detailed response regarding its actions related to the registration of Pernambuco wood stocks, highlighting a high level of organization, especially among the members of the German Association of Bowmakers. The Federal Agency for Nature Conservation (FANC) reported that an inventory of Pernambuco wood stocks was conducted for the association's members. This inventory includes all stocks from the association's members but does not cover stocks from other entities that may have Pernambuco wood in the country. This means that, although progress has been made in assessing stocks, the registration is still not complete.

Figure 9. Pernambuco wood Stock Register, Germany 2022

Germany
Notification 2023/033
Annex 1 to questionnaire

Pernambuco stock
Survey of the members of the German Bow Makers Association
Status: 2022

Bow maker (anonymised)	Stock of blanks (no)	Stock of sawn wood (kg)	Stock of logs (kg)	Stock of finished musical instruments (no)				Annual consumption	
				Violin	Viola	Cello	Double bass	Blanks	kg
1	100	200		0	0	2	1	50	
2					1	2	4	6	
3	980	2800		5	3	1	1		80
4	630	380	50	6	1	3	1		40
5	11022	5115						115	
6	43833			1044	127	427	36	2174	
7	6921	5615		150	70	70	12	30	
8	25		4	4				24	
9	3985								
10	4			80	20	100	4	66	
11	17500	11155		20	10	10		180	
12	300			99	29	96	3		
13	20000	986	54						500
14	75	3		2				10	
15	120	2		5	2	4		8	
16	1240	1233							15
17	9020	329		34	18	24	2	150	
18	222000			50	12	25	20	7350	
19	1500	900		20	10	10	5	20	
20	750	49		3		2		12	
21		1500		15	2	7	8	70	
22				1	1	1	2		70
23		3025		28	19	21	17		30
24	300			67	14	35	2	15	150
25				113	44	65	7	450	
26	293	761	2505		2	1	2	1	12
27	1500			4	3	4		20	
28	22000		1100			400		1000	
29	80	800		5	4	6	1	20	
30	4000	655		6	5	7	3	10	
31	25370	304	609						
32	1200	2400	1600	10	7	8	5		200
33	103360			77	34	46	20	300	
34	80	800		5	4	6	1	20	
Sum	**498188**	**39012**	**5922**	**1853**	**442**	**1383**	**157**	**12101**	**1097**

Source: Germany, Federal Agency for Nature Conservation (FANC), 2023.

Furthermore, Germany reported that the national inventory, which would include the stocks of all Pernambuco wood owners, has not yet been completed, partly due to the short time since the start of this CITES initiative. However, the Federal Agency for Nature Conservation expressed its commitment to presenting a complete inventory of stocks later on, demonstrating a continuous effort to ensure that all stocks in the country are properly registered.

Another relevant German entity, the Bundesinnungsverband (Federal Association of Guilds), also contributed with additional information, reporting that bow manufacturing companies have registered their Pernambuco wood stocks with the Federal Environmental Agency and that this information has been documented. The association also conducted an internal survey on wood stocks among its member companies, the results of which were attached to the provided response.

However, Germany acknowledges that the work is not yet complete and that other stocks outside the association of bow manufacturers still need to be included in the national inventory. This scenario highlights both the progress and challenges faced by the country in establishing a national inventory system for Pernambuco wood.

D. Sweden

Sweden's response indicates a more consolidated approach regarding the registration of Pernambuco wood stocks, although it is limited to the stocks that existed at the time of the species' listing in CITES. The country reported that, at the time of the inclusion of Pernambuco wood in the list of protected species, a record of pre-convention stocks was made. This record was well documented, and Sweden currently has four pre-convention stocks, totaling 1.2 tons of Pernambuco wood. However, Sweden does not mention whether there has been any follow-up or updates to these records since 2007, which may suggest a gap in the continuous traceability of stocks over time. In its response to Notification to the Parties No. 2025/076, Sweden re-confirmed that it registered *P. echinata* timber and indicated that since

the original registration only one additional import of pre-Convention timber has been approved of 0.51 cubic meters of billers, boards and sticks. Information from manufacturers indicates that they are working actively to use as much raw material as possible in each strand, thereby reducing waste. The material available in Sweden supports annual production of approximately 20 bows per active bow maker.

E. The Netherlands

The Netherlands' response presents a specific example of an importer's effort to register Pernambuco wood stocks. The country reported that a Pernambuco wood bow importer indicated that the remaining bows in stock are properly marked with a registration number. This information is relevant as it demonstrates that there are traceability initiatives in the private sector, even if they appear to be limited to a few actors.

F. Slovakia

Slovakia, represented by the Ministry of the Environment/the CITES Management Authority, has demonstrated a proactive stance regarding the registration of Pernambuco wood stocks. Although the country acknowledges the existence of registration systems in Germany and Austria, Slovak authorities are at the beginning of a process to address registration at the national level. The authorities identified the presence of a bow manufacturer in the country and planned to hold a meeting with the producer in May 2023 to discuss the production, registration, and marking processes for bows. The intention is to establish a voluntary registration of Pernambuco wood stocks, demonstrating an interest in promoting the legality and traceability of materials in the future.

G. United Kingdom of Great Britain and Northern Ireland

The United Kingdom indicated in its response to Notification to the Parties No. 2025/076 that it has collaborated with industry stakeholders to introduce a formal, voluntary stockpile registration system. This system will be hosted on GOV.UK, the official website of the Government of the United Kingdom which serves as a centralised platform for accessing government services, information, and guidance for both citizens and businesses.

The voluntary registration system will invite holders and owners of *P. echinata* wood (timber, bow blanks, sticks) to register their stockpiles. Users will be asked to provide information including the size of the stockpile, planned use, and traceability details. This voluntary registration system is being developed in collaboration with stakeholders. Industry representatives have expressed strong interest in participating, and engagement with bowmakers and the wider music sector has been constructive and collaborative.

The United Kingdom is finalizing its voluntary registration system following a successful pilot with a group of stakeholders. Feedback from the pilot has been positive, and the United Kingdom anticipates officially launching the stockpile register in summer 2025.

Within the United Kingdom, it is assessed that there are sufficient stocks of *P. echinata* specimens to meet the needs of the small number of domestic bow makers. Stakeholder consultations indicates that, at the current rate of use, existing stockpiles are expected to support the low level of bow-making in the United Kingdom for several decades.

There is no present demand to import additional *P. echinata* timber. All previous import records listed in the CITES Trade Database refer exclusively to pre-Convention specimens. Accordingly, the United Kingdom does not anticipate issuing permits for the import of *P. echinata* timber in support of Brazil's efforts to regulate the timber component of this trade and remain committed to international conservation objectives under CITES.

H. International Alliance of Violin and Bow Makers for Endangered Species

The International Alliance of Violin and Bow Makers for Endangered Species, an organization formed in 2018 by associations of instrument and bowmakers, trade members, suppliers, performing arts organizations, and individuals, is developing a voluntary traceability system for the production of violin bows and other instruments, with a specific focus on Pernambuco wood (Alliance, 2024).

The main steps outlined for the voluntary tracking system for Pernambuco wood are as follows (Alliance, 2024):

a. Inventory Wood: The process begins with creating a detailed inventory of wood, identifying its quantity and origin. This involves completing an inventory form and keeping all relevant records, such as invoices or other documentation indicating the date and supplier of the wood.

b. Number Boards: Each board of wood should be individually numbered on the end and weighed. Photographs of the numbered boards should be taken and kept as part of the inventory records. A journal should also be kept recording all pertinent information.

c. Cut and Number Individual Sticks: After being numbered, the boards are cut into blanks, which should also be photographed, including the end-cut showing the original board number for identification. Each bow blank should be marked with a number that includes the original board number.

d. Stamping the bottom facet of the bow: The stamp includes the board and bow blank number and date. As result, the bow can be traced from finished bow all the way back to the original inventory.

d. Documentation and Record Keeping: A file must be maintained with all relevant records, including dated photographs and authenticated documents. This documentation should be stored securely and updated regularly.

e. Updating Inventory: The inventory should be updated periodically, especially if it has not been updated since 2007. This ensures that the quantity of wood recorded is close to the actual amount of wood in the maker´s shop.

The information on Pernambuco wood stocks from this voluntary system should be communicated to buyers and musicians who acquire the bows. The goal is to provide these individuals with detailed data that allows for tracking the finished bows back to their original inventories. This includes documentation accompanying the sale, such as the Bow Material Declaration, which contains information about the wood origin and the numbering of the blanks used in manufacturing (Alliance, 2024).

Furthermore, the proposed system recommends that manufacturers maintain organized and updated records that can be shared with authorities or stakeholders when necessary (Alliance, 2024).

H. ForestBased Solutions, LLC

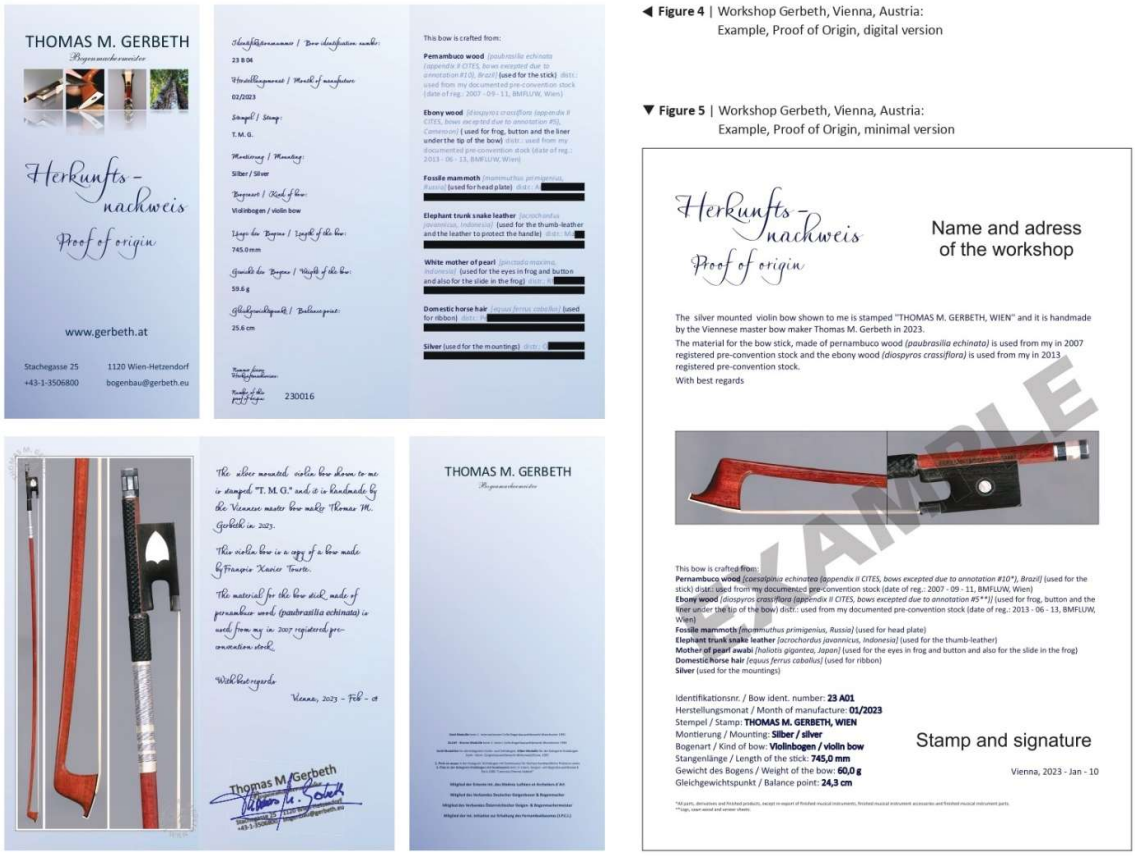
ForestBased Solutions, LLC highlighted the lack of adequate investment in Non-Detrimental Findings (NDF) and Legal Acquisition Findings (LAF) in Brazil, which directly affects the capacity for monitoring and controlling wood stocks.

ForestBased Solutions has committed to collaborating on a comprehensive survey of the species, encompassing inventory, distribution, regeneration, and silviculture practices. This initiative is important for promoting the sustainability and legality of Pernambuco wood utilization. The company also mentioned that it has private sector partners willing to fund part of the work, demonstrating that there is a willingness from the business sector to contribute to the conservation and sustainable use of this species, if governments and institutions cooperate in creating a structured control system.

I. American Federation of Violin and Bow Makers (AFVM)

According to AFVM, in 2007, the Ministry of Ecological Transition in France began the voluntary registration process for pre-convention wood stocks, but there has been no monitoring or enforcement of regulations since then. This situation is like that of other countries, such as Germany and Austria, where stock registration was conducted in the past, but the current status of these stocks is uncertain due to a lack of continuity in monitoring processes.

Figure 10. Model of Certificate of Origin Austria by Thomas Gerbeth



◀ **Figure 4** | Workshop Gerbeth, Vienna, Austria:
Example, Proof of Origin, digital version

▼ **Figure 5** | Workshop Gerbeth, Vienna, Austria:
Example, Proof of Origin, minimal version

Source: Thomas Gerbeth (2024).

The AFVM emphasizes the importance of creating a uniform system for the registration and recognition of pre-convention stocks, which would allow for the legal and sustainable use of Pernambuco wood. This appeal aligns with the need to regularize existing wood stocks, ensuring that artisans can continue their work without threatening the species. AFVM also highlighted that in some regions of Germany, CITES authorities have been monitoring these stocks more rigorously, demonstrating that when active enforcement exists, there is a higher level of compliance with regulations.

In Belgium and Italy, practices vary among regions, with some areas offering the possibility to declare stocks, while others do not implement uniform measures. In the United States, there was an incentive for bow makers to voluntarily document their stocks in 2007, but without the establishment of a formal government process. This illustrates the fragmentation of registration policies in countries where the demand for wood is high, highlighting the importance of a globally standardized system, as suggested by the AFVM.

J. Additional observations on registration of stockpiles

The implementation of a uniform / standardized and global stockpiles registration system, as suggested the respondents to the Notification, among additional efforts in enforcement and international cooperation, is necessary to promote the sustainable and legal use of Pernambuco wood, ensuring the protection of the species and compliance with international standards.

2.4. Capacity building

The analysis of stakeholder responses regarding capacity building actions for monitoring and controlling the trade of *Paubrasilia echinata* reveals an urgent need for standardization, harmonization, and strengthening of technical and institutional capacities. Countries and organizations highlight a range of

specific challenges and suggest strategic interventions aimed at improving the control of illegal trade and the protection of the species.

A. Austria

Austria highlights the importance of harmonizing approaches in the monitoring of *Paubrasilia echinata*. A fragmented system can create gaps that are exploited for illegal practices, as has happened in the past. In this context, harmonization emerges as a need to avoid inconsistencies that undermine conservation efforts.

B. Brazil

IBAMA provides a technical perspective based on the reality of Brazilian bow making companies that utilize *P. echinata*. The main capacity building action suggested involves training related to classify the quality of wood used in the production of bows for musical instruments. Many companies maintain stocks of wood that do not meet the required quality standards for bow production, leading to waste and confusion in the supply chain. The proposal is to identify and eliminate this inadequate wood from the company´s inventory, contributing to transparency in the sector.

Additionally, Brazil suggests implementing training in isotope techniques to identify the origin of the wood, allowing for the distinction between wood sourced from natural forests and that from plantations. This proposal is important for combating illegal trade, allowing only wood from legally recognized sources to circulate in the market. Another relevant aspect is training in wood identification, which aims to empower enforcement agents to differentiate between species, materials, and provenance, strengthening monitoring and control at borders and within the domestic market.

C. Canada

Canada suggests three central interventions as the most urgent capacity building needs: (1) creation of a standardized traceability system; (2) development of a centralized database; and (3) ability to differentiate between finished bows and Pernambuco wood in circulation in the market. The establishment of a centralized database would contribute to the efficient monitoring of international trade and facilitate the enforcement of CITES regulations.

D. Czechia

The Czechia, through its Ministry of the Environment, highlights the need for training in the identification of Pernambuco wood. Training enforcement officials would be essential for them to more efficiently distinguish between Pernambuco wood bows and other materials, facilitating trade control. The lack of this skill creates weaknesses in the monitoring system and can result in the circulation of illegal material.

E. Germany

Germany, through FANC, proposes the development of a traceability or marking system that follows bows from their raw state through production of finished bows to final commercialization. An integrated marking system would allow for much more effective control of the origin and destination of bows, ensuring that only products from legal sources enter the market.

F. Sweden

Sweden suggests the development of a reliable marking and tracking system for bows, as well as support to Brazilian authorities in combating illegal trade. This international collaboration is viewed as very important, as Brazil, being the country of origin for the species, faces significant challenges in monitoring trade. Sweden also suggests the production of identification materials and training for customs agents, an initiative that strengthens the importance of training key agents involved in enforcement.

G. The United Kingdom

The United Kingdom offers an approach focused on two main pillars: the conservation status of the species and support for enforcement in Brazil. First, the country emphasizes the urgent need for an update of the status of *P. echinata* on the IUCN Red List. The last assessment was conducted in 1998, leaving a considerable gap in current data regarding the population and conservation status of the

species. The UK supports the project by Botanic Gardens Conservation International (BGCI), which is carrying out a new assessment of trees through the Global Trees Assessment. However, it notes that there may be insufficient data for an accurate evaluation of the species, highlighting the need for a detailed forest inventory of the remaining populations.

In terms of enforcement, the UK points out that controlling illegal logging in Brazil is a relevant issue for the species' survival. The country stresses that the success of the decisions made during CoP19 depends on solid support for Brazilian authorities to implement the new annotations. The UK also emphasizes the need to strengthen enforcement capabilities in Brazil to address illegally harvested timber and the challenges related to the absence of verifiable legal origin.

H. United States of America

The United States provides a highly technical analysis, focusing on scientific and technological capacities aimed at improving the monitoring and control of the trade of *P. echinata*. The suggested training includes equipping inspection officers with skills in anatomical wood identification, which would allow for greater accuracy in species differentiation during enforcement actions. This is particularly important to prevent illegal materials from being traded as legal *P. echinata* wood.

The US also suggests the use of laboratory techniques, such as mass spectrometry and genetic identification, as well as training in the use of stable isotopes to identify the wood origin. These technologies are highly effective in product traceability and distinguishing between wood from plantations and that from other logging areas. Additionally, the country highlights the need to develop Non-Detriment Findings (NDF) to ensure that the export of *P. echinata* specimens does not threaten the survival of the species in its natural habitat.

Another key point is the issue of species cultivated in plantations. The US proposes evaluating the applicability of Resolution Conf. 11.11 (Rev. CoP18) on *Regulation of trade in plants*, determining whether existing *P. echinata* plantations in Brazil are viable sources for producing wood for the international market. These plantations could play an important role in reducing the illegal logging of the species.

I. ForestBased Solutions (FBS) LLC

FBS, a private company operating within the Pernambuco supply chain, presents a critical view of the current control and traceability structure. The company argues that 95% of the wood available for bow-making is already located outside of Brazil, making it difficult for Brazilian authorities to control the legality of the wood used internationally. To mitigate this issue, the organization suggests the creation of an international traceability standard for both wood stocks and finished bows. Such a system would ensure that only legally acquired products could be traded, establishing a solid foundation for transparency in the sector.

The organization also raises concerns about the lack of proper Non-Detriment Findings (NDF) and Legal Acquisition Findings (LAF). Moreover, ForestBased Solutions considers the species' evaluation critical for better understanding the dynamics of the trade and the conservation of *Paubrasilia echinata*.

J. American Federation of Violin and Bow Makers (AFVM)

AFVM proposes a set of initiatives aimed at both conservation and traceability, as well as capacity building within the musical sector. One of its main focuses is the establishment of a uniform international system for registering pre-Convention wood stocks. The current lack of standardization leads to confusion and allows illegal wood to enter the market, compromising the sustainability of the bow-making industry.

Additionally, AFVM proposes investigating a voluntary traceability system for bows produced after CoP19, which could be developed in collaboration with experts to learn more about the tools and approaches that may be best suited to the specific qualities of bows. Another relevant point is the need for awareness building activities, especially among bow makers and musicians, who are often unaware of CITES requirements and the legal implications related to the use of *P. echinata*.

AFVM also suggests supporting conservation initiatives, such as developing a forest inventory of native and planted populations of *P. echinata* in Brazil, in collaboration with public and private organizations.

The organization believes that protecting the Atlantic Forest is essential for the species' survival, as deforestation and agricultural expansion continue to threaten this biome. AFVM also proposes creating a transparent legal framework for the sustainable management of plantation wood, which would reduce illegal logging and increase the supply of legally sourced wood to the market.

Lastly, the federation calls for the elimination of fraud in the legal permitting process for *P. echinata* trade, a problem that, according to the organization, severely undermines conservation efforts and the legal market for bows and instruments. In other words, creation of transparent legal framework for the sustainable harvesting and use of Pernambuco wood coming from plantation holds the potential to reduce illegal logging and support bow making and stringed instrument music.

K. Additional observations on capacity building

Some actions stand out for their relevance and potential impact on enforcement and monitoring capacity:

- ✓ **Technical training:** Several stakeholders, including Brazil (IBAMA) and the US, highlighted the importance of training enforcement agents in the anatomical identification of wood, using both conventional techniques and advanced technologies like stable isotopes, NIRS and mass spectrometry. These actions aim to equip agents to distinguish *P. echinata* from other species and trace the wood origin, which is fundamental for controlling illegal trade.

- ✓ **Traceability and marking systems:** Countries like Canada and Germany emphasized the benefits of creating standardized traceability systems, from raw material to finished products such as violin bows. These systems are essential to ensure the legality of the wood used in global trade and prevent fraud and the rerouting of uncertified material.

- ✓ **Support for Brazilian authorities:** The UK and Sweden highlighted the need to support Brazil in combating illegal trade and regulating the harvesting of *P. echinata*. This support includes both international collaboration and the development of specific programs to strengthen local enforcement, ensuring that the decisions made at CITES meetings are effectively implemented.

- ✓ **Awareness raising and education:** AFVM stressed the urgency of awareness-raising activities for musicians and bow makers to increase knowledge about CITES regulations and the importance of legal compliance in the use of *P. echinata*. Awareness raising is seen as a necessary tool to improve cooperation between the music sector and regulatory authorities, which can take many forms such as advocacy for better regulatory and policy frameworks, collaboration and dialogue with enforcement agencies to prevent illegitimate businesses.

- ✓ **Promotion of a national forest inventory**: The UK and AFVM emphasized the importance of conducting a forest inventory of *P. echinata* populations, both natural forests and plantations, throughout Brazil. A well-structured inventory is key to building a reliable database on the distribution, abundance, and health status of *P. echinata* populations, facilitating sustainable management of plantations and focusing enforcement efforts on tracking and controlling the species.

2.5. Cross-cutting matters beyond traceability

This section addresses other key cross-cutting matters beyond traceability (already covered in Chapter 1), and that are related to the implementation of Decisions 19.251 to 19.252. The topics are related to Brazilwood plantation initiatives, Pernambuco wood production, consumption and trade trends, barriers to commercialization, awareness raising programs, research and development on *P. echinata* species.

A. *P. echinata* production initiatives in Brazil

Pernambuco wood/ Brazilwood plantations for production have been carried out primarily in the states of Espírito Santo and Bahia, even though there are no register of music instruments manufactured from planted Brazilwood trees.

a) State of Espírito Santo

In 2004, the Espírito Santo State Institute of Research, Technical Assistance, and Rural Extension (INCAPER) entered into a technical partnership agreement with the Brazilian Association of Bow Makers (ABA) for the subsequent five years, aiming to promote the reforestation of areas through support for the production and distribution of 500,000 seedlings of native Atlantic Forest timber species, with an emphasis on Pernambuco wood. The agreement not only covered the production and coordination of seedling distribution to farmers throughout the state of Espírito Santo, but also provided for the training and capacity building of employees and companies associated with the project. In addition, studies on the phenology and management of the species were conducted, as well as the provision of nurseries for seedling production (INCAPER, 2004).

In 2008, a new agreement was established between the company Aracruz Celulose, the Instituto Verde Brasil (IVB), and INCAPER, for one year, exclusively to promote Pernambuco wood reforestation in the mountainous regions (southwest and central) and the low-altitude areas of Caparaó, Polo Cachiero, and Litorânea Sul (South coastal area) in Espírito Santo state. This agreement followed the methodology defined in the Reforestation and Environmental Adequacy Program for Agricultural Properties, with the goal of implementing integrated projects on 60 agricultural properties, preferably within the micro-basins of major watercourses, in areas connected to Atlantic Forest remnants, in regions more susceptible to soil degradation, and in buffer or transition zones with conservation units (SEAG, 2008).

Under this latest agreement, it was the responsibility of IDAF to approve management plans for the establishment and management of reforestation in each individual project, monitor and oversee implementation on the selected properties, and carry out the georeferenced registration of the areas for Pernambuco wood plantations (SEAG, 2008).

The 2004 and 2008 projects did not include monitoring or oversight of the Pernambuco wood plantations. Recently, a research project developed in partnership with INCAPER, IVB, and the municipal governments of 25 cities in Espírito Santo aims to conduct dendrological assessments and analyze the social, economic, and environmental impacts of Pernambuco wood cultivation, based on the plantations established by the 2004 project. Data collection for statistical evaluations will be conducted directly on the properties of farmers benefiting from the Pernambuco Wood Project, with the objective of determining the effectiveness of the reforestation strategy used at that time (INCAPER, 2021).

Part of the results from the research project developed by INCAPER were presented at the Brazilian Congress on Pau-Brazil, organized by the Instituto Verde Brazil and ANAFIMA, held at the Federal University of Espírito Santo in November 2024. The study mapped and identified commercial plantations of the species, totaling 28,626 trees in 21 municipalities across the metropolitan, northern, central, and southern macro-regions of the state of Espírito Santo (Galveas 2024), which could potentially be used for manufacturing music instruments depending on further scientific research.

b) State of Bahia

The Executive Commission of the Cocoa Cultivation Plan (CEPLAC), a public agency under the Ministry of Agriculture, Livestock, and Supply of Brazil (MAPA), was created in 1957 with the objective of promoting the development of cocoa farming in the country, operating in six states, including Bahia, Pará, and Espírito Santo (MAPA, 2019). In addition to its primary focus, CEPLAC played an important role in conservation and reforestation initiatives for Pernambuco wood, seeking to integrate environmental conservation with agroforestry activity, especially in the cocoa-growing region of Bahia, where the cacao-cabruca cultivation system allows for the coexistence of agricultural production and biodiversity conservation (CEPLAC, 2009).

The Pernambuco Wood Program, an inter-institutional and multidisciplinary initiative by CEPLAC, was instrumental in promoting the conservation and sustainable use of this species. In 2009, the program set an ambitious goal to plant 500,000 trees over the subsequent five years, with seedlings allocated for different purposes: 50% for commercial use, 30% for genetic variability conservation, and 20% for civic and cultural initiatives. The program also aimed to seek new partners to increase the goal to 22 million trees, the estimated number of trees cut down over 500 years of human activity in Brazil (CEPLAC, 2009).

Despite the program's significant contributions, such as the production and distribution of seedlings, the traceability of these seedlings was compromised over time, especially with the reduction of CEPLAC's technical staff. Few records of the *P. echinata* plantations resulting from these efforts were kept. In Bahia, there are records of plantations conducted with seedlings from this program in the municipalities of Una

and Ilhéus, where, between 2005 and 2012, 13,612 Pernambuco wood seedlings were planted on just three properties (MATOS, 2016).

The status of the Pernambuco wood plantings at Nova Aurora and Maristela Farms, as of the 2016 survey, was quite positive. Together, these farms had a total of 11,112 seedlings, with the first planting starting in 2005. At Nova Aurora Farm, the Pernambuco wood trees, planted in an agroforestry system that includes Jequitibá timber species and cocoa, were on average 11 years old, with a Diameter at Breast Height (DBH) of 13.80 cm and an average trunk height of 4.43 m. It was observed that 53.3% of the trees had straight trunks, while 46.7% showed some type of defect (MATOS, 2016).

At the Maristela Farm, the Pernambuco wood plantings were also integrated into an agroforestry system, contributing to the diversity and sustainability of the plantation. Since the start of establishment of *P. echinata* plantations in 2005, the owner has registered the Pernambuco wood plantations with IBAMA and included the forestry areas in the Rural Environmental Registry (CAR). The owner received incentives from CEPLAC's Pernambuco Wood Program, with the donation of about 3,000 seedlings, covering the remaining implementation and maintenance costs with his own resources. Initially, technical assistance was provided through visits and guidance from program representatives, who also georeferenced the trees. However, since then, technical assistance has not been maintained (MATOS, 2016).

In contrast, at the Bolandeira Farm in the municipality of Una, the planting of 2,500 Pernambuco wood seedlings donated by CEPLAC's Pernambuco wood Program in 2007 faced serious difficulties. The inadequate selection of the planting area, which was open and lacked shade protection, resulted in the failure of the plantation, which was abandoned after four years. As of the last consulted report, this plantation was still not registered with the relevant environmental authority (MATOS, 2016).

In 2008, IBAMA monitored the development of the Pernambuco Wood Program's activities and issued a technical report when the program had been in operation for four years. At that time, IBAMA had already highlighted the need for the project to involve other industries that use Pernambuco wood to maximize the future use of the *P. echinata* plantations. Since bow production for musical instruments uses only a small part of the tree trunk, diversifying its uses could increase the sustainability of harvesting these forest plantation areas. Partnerships with industries of the forest sector, such as those in the paper and pulp sector, could contribute to the development of suitable clones for both the Brazilian forest sector and abroad (IBAMA, 2008).

During the project's monitoring, IBAMA also emphasized the importance of conducting a forest inventory to map and regularize Pernambuco wood plantations, which would promote sustainable management of the planted Pernambuco wood stocks in the future (IBAMA, 2008).

CEPLAC, despite its past relevance, currently faces a challenge of representation, which calls for renewed efforts and partnerships to ensure the continuity of incentives for the plantations and conservation of Pernambuco wood, essential for biodiversity and the sustainable development of the regions where this species is native.

c) International Pernambuco Conservation Initiative - IPCI

Recognizing the threat that deforestation posed to the populations of Pernambuco wood, a group of bow makers founded the International Pernambuco Conservation Initiative (IPCI), an international non-governmental organization with representations in Europe and North America. Since 1999, IPCI has worked with Brazilian partners to develop projects focused on commercial plantations, conservation, scientific research, and education (IPCI, 2024).

At the beginning of its activities, IPCI sought to establish collaborations with Brazilian institutions, with CEPLAC being one of its main partners. This partnership included the development of the Brazilwood Program (PPB), aimed at the conservation and sustainable use of the species (IPCI, 2024).

These projects resulted in the planting of new seedlings in a combination of nature reserves, civic areas, and private properties. Cooperation with local farmers and other landowners allowed IPCI and its partners to test planting methods and monitor the growth of the *P. echinata* trees. Both in consortium systems (such as cocoa farms in southern Bahia) and in homogeneous plantations (along the Brazilian Atlantic coast), the analysis of the productivity and quality of the wood planted by IPCI represents a new frontier, with the potential to boost the conservation and sustainable use of Pau-Brasil (IPCI, 2024).

Between 2001 and 2024, IPCI reported having invested approximately US$ 423,000 in programs in Brazil, in addition to covering operational expenses related to international educational outreach. These investments resulted in the planting of 340,800 seedlings, 18 completed projects, and the creation of 5 maps, with Pernambuco wood-related activities implemented in 69 municipalities in the state of Bahia and 14 in other states (IPCI, 2024).

B. Production and consumption of Pernambuco wood

A preliminary study conducted by IPCI indicated that approximately 100,800 Pau-Brasil bows were produced in 2002. The amount of wood required to produce these bows is difficult to calculate, as it depends on various factors, such as the selection and processing of the trees, with estimates suggesting that 1 m^3 of wood can yield between 700 and 1,500 bow sticks. To produce 100,000 bows, around 144 cubic meters of wood would be needed. A large tree can provide up to three cubic meters of wood, while smaller trees yield less (Espey & IPCI, 2010).

In Brazil, the production of bows for musical instruments is concentrated in the hands of about 30 artisans and small companies, mainly in the state of Espírito Santo. These initiatives, often family-run, provide work and income opportunities for more than 150 families, resulting in an annual production of approximately 8,000 units (Ação Civil Pública, 2022).

The demand for Brazilwood, essential to meet the global market for bow manufacturers, is low. Records of forest inventories, to be verified by environmental authorities, could be assist in meeting the global demand for this product if they are in suitable conditions and meet technical standards. According to Brazil the available data on these plantations are fragmented and technically insufficient and a process will be required to inspect and verify information.

In checking the forest inventory data in the municipality of Aracruz, Espírito Santo State conducted in October 2022, it was found that the Brazilwood lots had ages ranging from 17 to 25 years. These plantations showed good productivity, with an average basal area of 27.03 m^2/ha and a total wood volume of 662 m^3, along with 197 m^3 of thin branches (with a diameter of less than 10 cm). The average wood volume per hectare was 93 m^3/ha, with productivity varying between 11.8 m^3/ha and 301.9 m^3/ha. The Average Annual Increment (AAI), an important productivity parameter, showed an average of 4.89 m^3/ha/year for all lots (Del Piero, 2022a).

Regarding the planting of Brazilwood in João Neiva municipality, in Espírito Santo State, also inventoried in October 2022, the ages of the lots ranged from 3 to 30 years. The data once again indicated good productivity, with an average basal area of 37.20 m^2/ha and a total wood volume of 120.15 m^3, along with 41.29 m^3 of thin branches. The average wood volume per hectare was 127 m^3/ha, with productivity varying from 108.2 m^3/ha to 156.2 m^3/ha. The average AAI for this plantation area was 5.11 m^3/ha/year (Del Piero, 2022b).

It should be noted that the data from the forest inventory show significant variability in the productivity of plantations, demonstrating that each plot has unique development characteristics. This makes it challenging to draw accurate inferences for other plantations, highlighting the need to conduct systematic forest inventories across all mapped areas.

Other than that, within the framework of the present report and through interviews with forest producers (see Annex C), other plantations were identified which although they have not conducted a forest inventory of their areas, did provide dendrometry data that demonstrate the current size of the forests, with diameters exceeding 70 cm of DBH in plantations established in the 1970s.

The inventory data point to the potential commercial viability of these Brazilwood plantations. However, it is important to note that only the status of two plantations that are more advanced in terms of regularization and registered with the competent environmental authorities are presented in this report. This underlines the urgent need for extensive efforts to inventory other Pernambuco wood stocks.

C. National trade in Pernambuco wood - Brazil

The Brazilian domestic market for violin bows made from Brazilwood is one of the most profitable activities in the forestry sector. This is due to the high added value of the products, a result of the specialized work of artisans and bow makers. According to a survey conducted in the framework of the present report with companies and artisans involved in the production of Brazilwood violin bows, the

average price of these items ranges from US$ 500.00 for bows intended for students and amateurs, reaching up to US$ 8,000.00 for high-end bows aimed at professionals and orchestras. This market has enormous income-generating potential, with the capacity to move millions of dollars and create jobs and economic development for violin bow producers. Brazil indicated that at the same time, precisely because of the high value of the tree, this market poses significant threat to the species, which is further exacerbated by international demand and illegal trade.

No Pernambuco bows have been legally exported since the entry into force of Normative Instruction No. 08/2022 (IBAMA, 2022) on June 1st, 2022, since every requirement for Licenses, Permits, Certificates and other Documents (LPCO) have been denied. No CITES Permits have been issued for the export of bow blanks or bows since after the amendment in annotation # 10 that was approved at CoP 19 in November 2022 that entry in to force on February 23, 2023. For registration purposes in the Integrated Foreign Trade System (Siscomex), bows are classified under NCM 9209.92.00, designated as "Parts and accessories of musical instruments of heading 92.02 (stringed musical instruments)". However, it is important to highlight that this category also covers other parts and accessories of string instruments, which calls for caution when making comparisons between states that may record different products under the same classification (FINDES, 2021).

D. Challenges for regulated trade

In interviews conducted with various Brazilian stakeholders about the current state of the production and commercialization of Pernambuco wood bows (see Annex C), variations in IBAMA's control were reported, particularly with regards to inspections and the measurement of Pernambuco wood stocks.

Another challenge identified is the application of the law. The Forest Origin Document (DOF), established by Ordinance No. 253 of 2006 from the Ministry of the Environment, is essential for the transport and storage of native forest products, as required by the Forest Code (Law No. 12,651 of 2012). However, the DOF requirement ends when the wood is transformed into a finished product, such as a violin bow, and the transport of this final product is exempt from additional documentation, according to Article 49 of IBAMA's Normative Instruction No. 21/2014.

Regarding forest harvesting, the Authorization for Forest Exploitation (Autorização de Exploração Florestal - AEF) is the document issued by agencies at the state level that allows harvesting within natural forests, isolated native timber species in a forest or agricultural farms and the use of woody material, as well as the utilization of forests planted with native timber species. Therefore, AEF is mandatory for the harvesting of native timber species. Companies and manufacturers of Pernambuco wood bows is required to acquire wood from suppliers who have that authorization, issued by the competent state environmental authority. However, even when legally sourcing wood, with all the required documentation, many companies reported that, IBAMA inspectors questioned the legality of the wood stocks in some instances.

After Operation Dó Ré Mi which started in 2018, IBAMA showed that a complex mechanism of laundering illegal wood from Bahia was going on in the last two decades and this illegal raw material fed the music industry. IBAMA'S agents claims that most of the companies maintained thousands of useless bow blanks in their yards: sticks that have minor defects - cracks, fissures, fractures, holes, knots, irregular grain, misaligned heads, rods that are too light, or with a low ‘Lucchi’ or other imperfections that fail to meet the demands of the international market. As new good quality bow blanks enter the companies' yards, acquired directly in Bahia or from intermediaries who sell illegally extracted wood bow blanks door to door, the companies keep an apparent accounting of the bow blanks with the documentation they have, burning – away from authorities’ eyes, the unusable bow blanks. Inspectors also claim that the acquisition of the plantation trees was intended to obtain virtual credits in the SisDOF to cover wood of illegal origin.

Analyses conducted by IBAMA’s agents point out that some reports produced by state agents to justify the origin of wood from fences and poles were fraudulent. While the federal agency claims to be unaware of formal plantation registrations, interviews revealed that some producers have already completed this registration with state authorities, such as in the states of Bahia and Espírito Santo. Greater integration between state agencies and IBAMA would facilitate the regularization of these plantations, with technical support provided to rural producers to complete the registration process at the federal level.

More importantly, no request for register in the federal system has been recorded. The industry should be further encouraged to register their own products and attest the sustainability of their production.

E. Awareness Raising Programs

The Brazilian government is in charge of the Atlantic Forest Research Program (PPMata), an initiative designed to promote scientific research, conservation, and sustainable development in the Atlantic Forest, one of the world's most threatened biomes, home of the Brazilwood. The program encourages multidisciplinary studies, integrating biodiversity, ecosystem services, climate change, and socio-economic aspects. PPMata fosters collaboration between universities, research institutes, and local communities, aiming to generate practical knowledge for public policies and conservation strategies. It also supports capacity building for young researchers and values traditional knowledge. By linking science, society, and decision-making, PPMata strengthens efforts to preserve biodiversity and promote sustainable use of natural resources.

The "Know Your Bow" program was developed in response to the growing concern for the conservation of Pernambuco wood. The initiative is supported by various organizations within the music community, including the American Federation of Musicians, the Association of British Orchestras, and the International Alliance of Violin and Bow Makers for Endangered Species, among others (MU, 2023).

The program aims to educate bow owners and users about the importance of documenting the origin of the wood used in their bows, particularly concerning CITES regulations. with the inclusion of Pernambuco wood in CITES Appendix II in 2007 and new permit requirements that came into effect in 2023, the program seeks to ensure that bows are traded legally and sustainably, promoting the conservation of the species and the ecosystem in which it grows (MU, 2023).

Additionally, the program encourages consumers to become informed about the legality and origin of the bows they own, helping to prevent illegal wood trafficking and protect Pernambuco wood populations (MU, 2023).

F. Research and development

Although *Paubrasilia echinata* is widely accepted as a monospecific genus, it shows considerable morphological variation. Three morphologically distinct groups are recognized and commonly referred to as "rue-leaf," "coffee-leaf," and "orange-leaf." Additionally, there are marked differences in the anatomical structure of the wood, suggesting intra-specific variations that are geographically delimited and correlated with the leaf morphology of these three morphotypes. The populations of *P. echinata* also show strong genetic differentiation along its distribution on the Brazilian coast. Studies are currently underway with higher sampling density and detailed phylogeographic analyses, along with morphometric analyses of diagnostic characters, to assess whether these morphotypes represent a continuum or whether they are distinct entities deserving taxonomic recognition (Gagnon et al., 2024).

The morphological and genetic variation observed in Pernambuco wood also has practical implications for the management and reforestation of the species. A research project at the Federal University of Southern Bahia (UFSB) is being developed in the southern region of Bahia, focusing on the silvicultural challenges related to the management of Pernambuco wood. This research seeks to fill knowledge gaps about the adequate silvicultural practices for native species of high commercial value, such as Pernambuco wood, whose lack of knowledge has hindered the implementation of effective reforestation and management strategies.

Other research is being carried out to identify the feasibility of using planted Brazilwood trees to manufacture bows. If the research finds that planted trees are equivalent to wild specimens, then sustainable production of violin bows may be achieved in the future.

One of the aspects studied is wood density, an important parameter for estimating biomass and carbon stock, influenced by factors such as age, diameter at breast height (DBH), and environmental conditions. However, the relationship between these factors is not yet fully understood, making research on the growth dynamics of the species relevant for the development of sustainable silvicultural practices that ensure wood quality for commercial use (Piotto, Neves, 2019).

In this context, the adoption of agroforestry systems (AFS) emerges as a potential solution to address these management challenges. AFS, which integrate tree cultivation with agricultural production, are a promising technique for diversifying production and restoring degraded ecosystems. In the case of Pernambuco wood, the implementation of AFS that also includes cacao (*Theobroma cacao*) plantation is being monitored as part of reforestation strategies. This combination seeks to revitalize the cacao crop,

which has faced productivity problems, while also providing a favorable environment for the growth of Pernambuco wood, creating a mutually beneficial relationship between the two species (Piotto, Neves, 2019).

CHAPTER 3: REFLECTIONS TOWARDS AN IMPROVED IMPLEMENTATION OF THE APPENDIX II LISTING OF *PAUBRASILIA ECHINATA*

In the context of classical music, Brazilwood is especially valued for making bows for string instruments. However, uncontrolled trade and illegal logging of this timber species, along with habitat loss, have put its survival at risk.

A significant challenge in the implementation of the Appendix-II listing of *Paubrasilia echinata* lies in the need for developing an effective traceability system to verify the legal origin of products derived from Brazilwood.

The present report document some commercially planted stocks of standing Brazilwood trees, the status of which should be verified by Brazil based on applicable legislative provisions.

A major obstacle to the effective implementation of the Appendix II listing and the regulation of the trade based on the current annotation is the absence of a standardized traceability system for *Paubrasilia echinata*. Addressing this issue requires the development of technologies capable of verifying the legal origin of products and implementing legal tools to track the wood from tree to final product—such as Brazil's Forest Origin Document (DOF). Regulating exploitation through measures like isotopic analysis and origin marking offers a promising solution, with proven effectiveness in various contexts.

To protect Brazilwood, it is essential to invest in awareness raising programs that engage both the music sector and consumers. Initiatives like "Know Your Bow" help educate musicians, orchestras, and consumers about the importance of purchasing legal and sustainable products. Such awareness raising campaigns are an effective way to maintain the value of Brazilwood as a resource while considering the feasibility to achieve sustainability. Furthermore, by highlighting the significance of the wood's origin and legality, public support for conservation policies is bolstered, and compliance with international standards is strengthened

The listing of *Paubrasilia echinata* in CITES Appendix II marked a significant step toward the species' protection, ensuring the continued use of Brazilwood in the cultural sector. Nevertheless, the absence of control of finished bows allowed bow trade to continue at a rapid pace, without the knowledge of Brazilian administrative authorities, as bows, in addition to being exempt from a CITES Permits, were also exempt from DOF as finished products.

A coordinated effort among various countries and sectors is essential to avoid wood laundry not only in Brazil, but in every country where bow makers produce finished bows. This includes establishing a robust tracking system, promoting sustainable management practices, encouraging commercial plantations, and, most importantly, raising global awareness about the critical need to preserve Brazilwood.

Based on the present report, Chapters 1 to 2, the Secretariat has developed the following non-exhaustive list of observations that could serve as a basis for future work on *Paubrasilia echinata*, including for example the implementation of the draft decisions adopted by the Standing Committee for consideration at the 20th meeting of the Conference of the Parties (see document CoP20 Doc. 97):

- **Establishment of commercial plantations of Brazilwood:** Investing in the establishment of commercial plantations of Brazilwood could be a key strategy in support of the sustainable use and trade of Brazilwood in the long term, as natural populations of Brazilwood have been negatively affected by historical exploitation and habitat fragmentation. The establishment of commercial plantations would help meet the demand of the musical instrument industry, particularly for bow-making, with legally sourced and traceable wood.

- **Conducting a National Forest Inventory:** Conducting an updated national forest inventory is necessary to quantify and monitor both the natural and planted stocks of Brazilwood in the country. This survey would provide essential data to understand the species' availability and to implement a traceability system that records the origin and volume of harvested wood. Such an inventory would serve as a foundation for public conservation policies and the enforcement of environmental laws, as well as helping to control trade by preventing illegally harvested wood from being mixed with legally sourced wood. The participation of IBAMA would be crucial to coordinate and regulate this inventory.

- **Active participation of the private sector in international fora and standardization of best practices:** Private stakeholders involved in the trade and conservation of Brazilwood are encouraged to participate in international fora, such as of CITES governing and advisory bodies, to standardize best practices in traceability systems and information sharing. These forums provide an opportunity for countries to discuss the most effective practices and regulations for the sustainable trade of Brazilwood. Brazil's participation is crucial for aligning national standards with international ones, ensuring that exports of Brazilwood products comply with global conservation and traceability requirements.

- **Brazilwood sustainable trade to be prioritized for the species long-term conservation:** Effective trade regulation in line with CITES requirements is recommended, with a traceability system in place to ensure that only wood of proven legal origin enters the market. The aim is to create a regulated market, thereby promoting sustainable harvesting based on commercial plantations and legalized stocks.

- **Establishment of a database for stockpiles and plantations:** The creation of a unified, centralized, and easily accessible database for registering Brazilwood stocks and plantations is highly recommended. This platform would consolidate information on the quantity and location of plantations, facilitating the monitoring and inspection of wood reserves. A comprehensive overview of stocks would enable authorities to enforce regulations more effectively, conduct targeted inspections, and engage in strategic planning for the sustainable use of the species.

- **Capacity building and support for local producers:** Providing continuous technical support to farmers and producers managing Brazilwood plantations is crucial. This includes training on sustainable management practices, silvicultural techniques, and compliance with environmental regulations. Such support would enable producers to improve wood quality, adopt more efficient cultivation practices, and promote both economic and environmental sustainability.

- **Support for research and development:** Investing in research on the best management practices, genetics, and productivity of Brazilwood is essential to enhance cultivation and conservation practices. Research and development projects, especially in partnership with universities and research institutions, would help to address knowledge gaps about the species, such as plantation techniques and its integration into agroforestry systems.

- **Regulatory adjustments in export control:** The system for registering and monitoring Brazilian exports is well-structured; however, differing market dynamics, such as large-scale bow production, call for more adaptable regulatory approaches. While detailed documentation is necessary for high-value professional bows, applying the same standards to mass production could impose excessive administrative burdens on manufacturing companies. It is advisable for the range State to continue to engage in dialogue with stakeholders to develop a control system that balances traceability requirements with the sector's practicality, aligning with the realities of large-scale production.

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ANNEXES

Annex A. LIST OF SYMBOLS AND ABREVIATIONS

%	Percentage
Art.	Article
Ha	hectares
Km^2	Square Kilometer
MM	Million
m^3	Cubic meter
N°.	Number
USD/US$	American Dollar Currency
p.y.	Per Year
°C	Degrees Celsius
CO_2	Carbon dioxide
€ /EUR	Euro
N.I.	Not Identified
N.A.	Not Applicable

ANNEX B. ACRONYMS

ABGD	Automatic Barcode Gap Discovery
ADA	Environmental Declaratory Act
AFVM	American Federation of Violin and Bow Makers
ASAP	Assemble Species by Automatic Partition
ATPF	Authorization for the transport of forest products
BGCI	Botanic Gardens Conservation International
CAFIM	Confederation of European Music Industries
CAR	Rural Environmental Registry
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CR	Certificate of Regularity
CSFI	Chambre Syndicale de la Facture Instrumentale
CTF	Federal Technical Registry
DOF	Document of Forest Origin
EILA	International Society of Violin and Bow Makers
FIM	International Federation of Musicians
GF	Forest Guide
GMYC	Generalized Mixed Yule Coalescent
IBAMA	Brazilian Institute of Environment and Renewable Natural Resources
IN	Normative Instruction
IPCI	International Pernambuco Conservation Initiative
LAF	Legal Acquisition Framework
LPCO	Licenses, Permissions, Certificates, and Other Documents
MMA	Ministry of the Environment
NDF	Non-Detriment Findings
PEARLE	Live Music Europe
PLS-DA	Partial least squares-discriminant analysis
SINAFLOR	National System for Controlling the Origin of Forest Products
SFM	Sustainable Forest Management Plan
WG	Working Group

ANNEX C. LIST OF INTERVIEWEES BY COUNTRY AND ORGANIZATION

Compilation as of 9 October 2024

#	COUNTRY	ORGANIZATION	CONTACT
1.	Brazil	Arcos Brasil LTDA - ME	Mr. Celso de Mello
2.	Brazil	ANAFIMA - National Association of the Music Industry	Mr. Daniel Neves
3.	Brazil	Bögen F. Schaeffer Brasil Instrumentos Musicais Ltda - ME	Mr. Floriano Schaeffer
4.	Brazil	CEPLAC - Executive Committee of the Cocoa Farming Plan, including Pernambuco wood plantations	Mr. Dan Érico Vieira Petit Lobão
5.	Brazil	Horst John e Cia LTDA.	Ms. Maria Jacy Almeida de Sousa Mr. Sinval Marques
6.	Brazil	IBAMA - Brazilian Institute for the Environment and Renewable Natural Resources, Management Authority Brazil	Mr. Allan Jordani Ms. Claudia Mello Mr. Daniel Pinho
7.	Brazil	IFV - Instituto Floresta Verde	Mr. Rui Rocha
8.	Brazil	INCAPER - Institute for Research, Technical Assistance and Rural Extension of Espírito Santo State / Embrapa Forests - Brazilian Agricultural Research Corporation Forestry	Mr. Pedro Arlindo Galveas
9.	Brazil	INMETRO - National Institute of Metrology, Quality and Technology	Ms. Maira Fasciotti
10.	Brazil	JBRJ - Botanical Garden of Rio de Janeiro	Mr. Haroldo Lima Ms. Claudia Barros
11.	Brazil	Arcos Marco Raposo Ind. Com. Importação e Exportação Eireli	Mr. Marco Antônio Raposo Nascimento
12.	Brazil	Pernambuco wood producer	Mr. Edmond Ganen
13.	Brazil	Program Arboretum	Ms. Viviane Barazetti
14.	Brazil	UFSB - Federal University of Southern Bahia	Ms. Juliana Neves
15.	Brazil	UFSB - Federal University of Southern Bahia	Mr. Daniel Piotto
16.	Brazil	Independent Forest Engineer – P. echinata agroforestry management	Mr. Fernando Moreno del Piero
17.	Brazil	Independent Consultant, Forest Engineer, former IBAMA´s servant	Mr. Sidney Sabbag
18.	Brazil	Lawyer	Mr. Valentim Couvre
19.	Brazil	Pineda & Krahn Law Firm	Ms. Maria Fernanda Messagi Ms. Nicole Voltarelli Amador
20.	Czechia	Ministry of the Environment, CITES Management Authority	Mr. Ondrej Kloucek
21.	Germany	Federal Agency for Nature Conservation, CITES Management Authority of Germany	Mr. Mario Sterz
22.	Germany	Federal Guild Association	Mr. Josef Gabriel

#	COUNTRY	ORGANIZATION	CONTACT
23.	United States	ForestBased Solutions	Mr. Robert Garner
24.	United States	International Brazilwood Conservation Initiative (IPCI) / Bowmakers	Mr. John Bennett Mr. Edwin Clément Ms. Lynn Hannings Ms. Heather Noonan Mr. Yung Chin Mr. Josef Gabriel Mr. Thomas Gerbeth
25.	United States	Bow maker	Mr. Charles Espey