

A stylized, light gray graphic of a tree with a thick trunk and several branches, set against a light gray circular background. The tree is positioned on the right side of the page, partially overlapping the title area.

Timber Exploitation in Colonial Brazil: A Historical Perspective of the Atlantic Forest

Veronica Maioli¹; Stefanie Belharte²; Marcela Stuker Kropf³; Catia Henriques Callado⁴

ABSTRACT

Timber was an important resource for the construction of colonial Brazil, although pertinent information is limited. We used the available archival material and an interdisciplinary methodology, spanning historical, botanical and ethnobotanical methods, to illuminate the exploitation of native timber during the colonial period and its relevance for the contemporary conservation status of the Atlantic Forest. Central to our methodology was the development of a standardized protocol focusing on folk names for timber trees, which permitted us to relate historical records and ecological data. Even though historical information is scarce, scattered, and sometimes contradictory, we could demonstrate the past prestige of timber as well as the harvest impact on local forests. We conclude that the extensive exploitation of the Atlantic Forest's timber resources throughout the colonial period contributed to the current state of vegetation, where many of the species abundant in the past are now rare and threatened.

Keywords: Atlantic Rain Forest; Environmental History; Logging; Madeiras de Lei; Nature Conservation Laws; Timber extraction.

¹ PhD in Ecology and Evolution (Universidade do Estado do Rio de Janeiro), Researcher at Instituto Internacional de Sustentabilidade (IIS), Programa de Pós-graduação em Ecologia e Evolução, Universidade do Estado do Rio de Janeiro (UERJ); ORCID: 0000-0003-0839-8765. E-mail: v.maioli@iis-rio.org, vmaioli_az@hotmail.com.

² Stefanie Belharte. PhD in Environmental Anthropology (University of Kent), Independent Researcher, ORCID 0000-0002-3649-7616. E-mail: stefanie.belharte@posteo.de.

³ Marcela Stuker Kropf. PhD in Forest and Environmental Sciences (Universidade Federal Rural do Rio de Janeiro), Professor at Instituto Latino-Americano de Ciências da Vida e da Natureza, Universidade Federal da Integração Latino-Americana (UNILA), ORCID: 0000-0002-1550-8398. E-mail: marcela.kropf@unila.edu.br.

⁴ Catia Henriques Callado. PhD in Ecology (Universidade Federal do Rio de Janeiro), Professor at Programa de Pós-graduação em Ecologia e Evolução, Laboratório de Anatomia Vegetal, Departamento de Biologia Vegetal, Instituto de Biologia Roberto Alcântara Gomes, Universidade do Estado do Rio de Janeiro (UERJ). E-mail: ccallado@uerj.br, catia.callado@gmail.com.

INTRODUCTION

The Atlantic Forest of Brazil as we know it today, constitutes a biogeographic region shaped by human activities, rendering it a historical record of human–environment interactions⁵. Such interplay commenced with the arrival of prehistoric humans on the biome and continues to the present day. The colonial period, however, constitutes a watershed on the historical trajectory, launching a radical transformation of the landscape. The colonizers arrived with a predatory mind-set, increasing the impact on the environment, which reflected the world political context of the time. The changes they wrought, amplified in subsequent eras, set the course towards contemporary nature conservation concerns in the Atlantic Forest.

In 1500, the expedition of Pedro Alvares Cabral arrived in the lands of what is now Brazil, delivering the Europeans to a vast tropical vegetation. At the time, the Atlantic Forest covered about 150 million hectares, extending from the Brazilian coast⁶ to areas of what are now Paraguay⁷ and Argentina⁸. Only remnants are left in Brazil today, stretching from the Rio Grande do Norte to the Rio Grande do Sul⁹. The intervening five hundred years of indiscriminate use and occupation have dramatically reduced the biome to between 8% and 16% of its pre-conquest cover^{10,11}, pushing it to fifth position among the world's most threatened biomes¹². While much of this loss was incurred in the 19th and 20th centuries¹³, the colonial period made an early contribution in its own specific way. Illuminating the particularities of colonial

⁵ Rogério R. de Oliveira and Inês M. da Silva. 2011. "História da paisagem e paisagens sem história: espécies exóticas e nativas manejadas na Mata Atlântica", In *Saberes e usos de plantas: legado de atividades humanas no Rio de Janeiro*, ed. by Ariane Peixoto and Inês M. Silva, (Rio de Janeiro: Editora PUC-Rio), 68-82.

⁶ Cezar M. Ribeiro et al., "The Brazilian Atlantic Forest: How much is left, and how is the remaining forest distributed? Implications for conservation," *Biological Conservation* 142, n. 6 (March 2009): 1141–1153.

⁷ Chengquan Huang et al., "Rapid loss of Paraguay's Atlantic forest and the status of protected areas – a landsat assessment," *Remote Sensing of Environment* 106, (2007): 460–466.

⁸ Alejandro R. Giraudo, "Dynamics of biodiversity loss in the Argentinean Atlantic Forest: an introduction", In *The Atlantic Forest of South America: Biodiversity Status, Threats, and Outlook*, ed. by Carlos Galindo-Leal, and Ibsen de Gusmão Câmara, (Washington: CABS and Island Press, 2003), 139–140.

⁹ Sos Mata Atlântica/Inpe/Isa, *Atlas dos remanescentes florestais da Mata Atlântica no período 2008-2010: dados parciais dos estados avaliados até maio de 2010* (São Paulo: Fundação SOS Mata Atlântica e Instituto de Pesquisas Espaciais, 2010).

¹⁰ Sos Mata Atlântica/Inpe/Isa, *Atlas dos remanescentes*.

¹¹ Ribeiro et al., "The Brazilian Atlantic Forest".

¹² "Biodiversity hotspots," Conservation International, Accessed April, 2011. <https://www.conservation.org/priorities/biodiversity-hotspots>.

¹³ Warren Dean, *A ferro e fogo: a história e a devastação da Mata Atlântica brasileira* (São Paulo: Cia. das Letras, 1996).

timber exploitation and its relevance for contemporary conservation issues are the subjects of this study.

The colonial period, considered here from 1530 to 1822¹⁴, refers to the centuries in which the territory, part of which is now Brazil, was subject to Portuguese control. By the beginning of this period, some European countries had already exhausted their forests of the best quality timber. This was especially true in the case of Portugal, whose history of deforestation began in the twelfth century. For them, the discovery of a land in which "to extend one's sight to the horizon one could not see anything but groves" (*our translation*) as described by Pero Vaz Caminha, represented the prospect to replenish their resources in terms not only of territory but also of timber^{15,16}.

In fact, timber was the basis of the first economic phase of the colony. One source of timber in particular caught the Europeans' attention – the brazilwood tree (pau-brasil in Portuguese, botanically *Paubrasilia echinata* (Lam.) Gagnon, H.C.Lima & G.P.Lewis) – the main raw material export in the first decades of occupation¹⁷. It has excellent wood quality with multiple uses^{18,19}, besides providing a red pigment widely used at the time for dyeing²⁰. Despite the renown, it was not the only timber exploited. Over time, the colonizers identified numerous other timber species and expanded their focus of extraction.

Since wood was indispensable not only for daily and commercial activities but also for warships, the access to high-quality timber was intrinsically linked to both economic and national security. Whoever had access to more wood could manufacture more ships, with the implication that "He who rules the sea, rules the

¹⁴ The year 1530 marks the beginning of the colonial period with the colonizing expedition of Martins Afonso de Souza followed by the implementation of the hereditary Captaincies. The final mark is the independence of Brazil in 1822.

¹⁵ João M. da S. Marques, *Descobrimientos Portugueses*. V.1 (Lisboa: INIC, 1944).

¹⁶ Diogo de C. Cabral, "Floresta, política e trabalho: a exploração da madeira," *Rev. Bras. Hist.* 28, n. 55 (Jan./June 2007): 217-241.

¹⁷ Carlos J. C. Bacha, "O uso de recursos florestais e as Políticas econômicas brasileiras - Uma visão histórica e parcial de um Processo de desenvolvimento," *Est. Econ.* 34, n. 2 (Apr./June 2004): 393-426.

¹⁸ José Elias de Paula, and José Luiz de H. Alves, *Madeiras Nativas- anatomia, dendrologia, dendrometria, produção e uso* (Brasília-DF: Fundação Mokiti Okada, 1997).

¹⁹ Francismar F. F. Aguiar et al., "Seed germination and seedling growth of *Caesalpinia echinata* Lam. (Brazilwood): shading effect," *Revista Árvore* 29, n. 6: (November/December 2005) 871-875.

²⁰ G.P. Lewis, *Legumes of Bahia* (Richmond: Royal Botanic Gardens Kew, 1987).

land"²¹. The circumstance that Portugal colonized the richly wooded lands of present-day Brazil indeed increased its chances of maintaining and extending its naval power from the 16th to the 18th centuries when marine traffic was intense. Brazil occupied a strategic position for those who crossed the Atlantic, and many ships took advantage of the Brazilian coast to obtain timber for repair and freight²². Accordingly, timber was considered a resource of national importance and became an incentive for political maneuvering²³.

Despite the immense importance of Brazilian timber in the colonial period, information about the species and how they were used is scarce. The period itself has traditionally been neglected in comparison to others (e.g. the 19th century), and the little documentation that does survive from the period has not been properly systematized yet. To fill part of this gap, we present here the archival dimension of a larger project (Use of Atlantic Forest timber in historical buildings). This larger study investigated the use of timber from the Atlantic Forest for construction during the Brazilian colonial period in much detail, and associated past use of timber species with current conservation issues. It integrated botanical, ecological, and historical approaches and relied on archival, field and lab research. In the present paper, we focus on one of its cornerstones: an inventory of historical documents, which provided the baseline reference on the extraction of timber, pertinent legislation, and contemporary conservation issues. Based on this inventory, we will present timber use as an important dimension of Brazil's colonial history whose ecological effects still reverberate today.

INTERDISCIPLINARY DATA GENERATION AND ANALYSIS

The process of compiling the inventory and evaluating it systematically is represented in Figure 1. This indicates also how we combined theories and methods from botanical, historical and ethnobotanical disciplines. The process basically

²¹ Shawn W. Miller, *Fruitless tree: Portuguese conservation and Brazil's colonial timber* (Stanford University Press: Stanford, California, 2000), 12.

²² L.M. Hutter, "O emprego da madeira e outras matérias-primas do Brasil na construção naval," *Rev. Soc. Bras. Pesq. Hist.* 26, n. 2 (2005): 15-51.

²³ Cabral, "Floresta, política e trabalho".

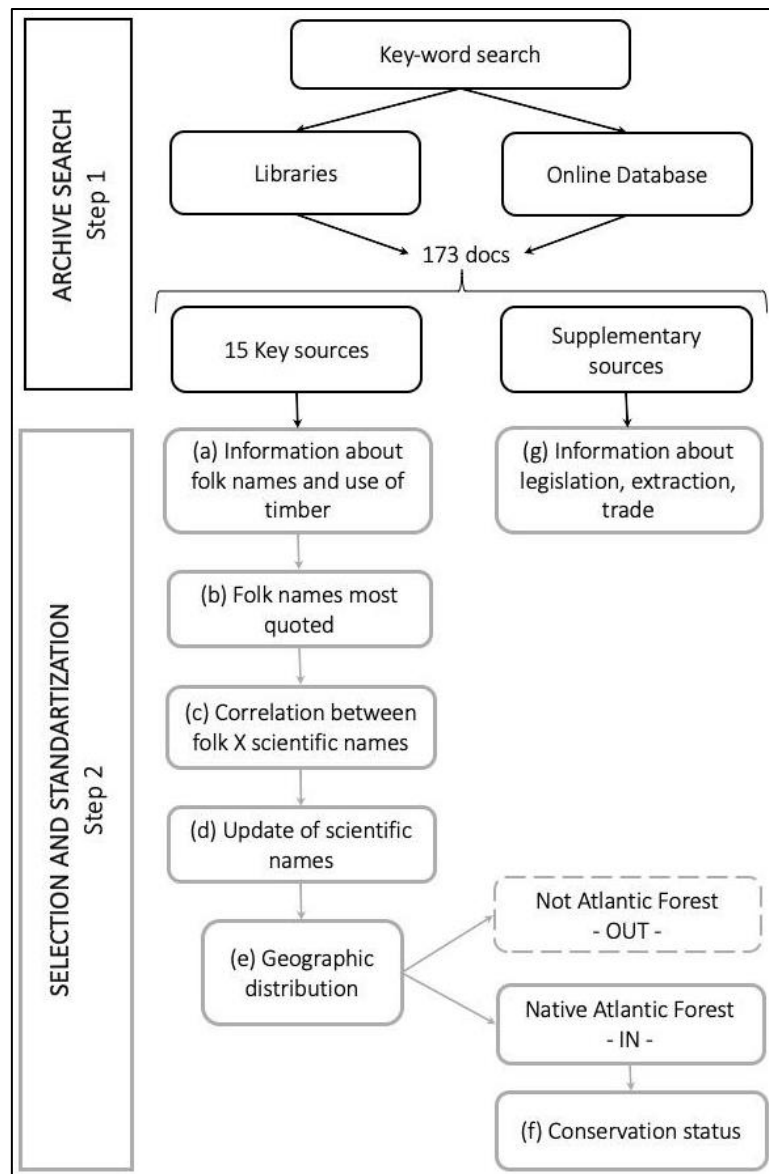
consisted of two main steps: (1) inventory of publications and documents related to timber in the colonial period; (2) selection and standardization of information linked to the kind, use and conservation status of Atlantic Forest timber species.

For the gathering of archival and published material of Step 1, we consulted seven significant collections as well as two on-line databases. These were: in Brazil, The National Library and National Archives in Rio de Janeiro, and the library of São Paulo's University (USP); in Munich (Germany), the library of Ludwig-Maximilians-Universität and the Bavarian State Library; in Lisbon (Portugal), the Torre do Tombo National Archive and the Ultramarine Historical Archives; and, electronically, the BIOSIS (life sciences bibliographic database) and CAPES (Higher Education Personnel Improvement Coordination – Brazil) portals.

The inventory considered original documents and references from the Brazilian colonial period using a set of broad word strings with Boolean searches such as: wood OR tree, OR sticks (paos in Portuguese), OR construction, OR boats (fragatas in Portuguese), OR navy, OR brazilwood, AND colonial Brazil, AND coastal Brazil AND Atlantic Forest, indexed in the title, description, abstract or body of the text, in English and Portuguese. We also selected materials that mentioned the extraction, sale, trade, transportation or use of Brazilian timber during the analyzed period, including the relevant legislation, decrees and royal letters. Overall, we found 173 documents. Fifteen of these specified the vernacular (folk) names of timber and/or its uses for construction and were classified as 'key sources'. The remainder contained other relevant information related to the historical aspects of timber legislation, extraction, etc. and was classified as 'supplementary sources'.

Following compilation and classification of sources, we proceeded to analyze them in Step 2 – in particular, to translate the folk names for timber in the historical records into the names for species recognized by science today. This task, however, is complicated by the complex relationship between vernacular and scientific botanical terms. The references selected as key sources listed hundreds of trees with their folk names. Correlating these with scientific names was not only a painstaking operation but by no means straightforward – a problem that has been widely recognized in the

Figura 01. Methodological flowchart illustrating data collection and analysis.



Fuente: Created by the authors.

field of ethnobotany^{24,25}. In particular, the semantic fields denoted by folk and scientific terms, respectively, may but partially overlap, so that terms cannot be completely paired to one another. Also, a species recognized as a single taxon scientifically may appear as several distinct taxa in the vernacular, due to people's perception of phenotypical variation, such as different colors and leaf size, taller trees etc. (which can occur particularly upon different ecological conditions). Conversely, a

²⁴ B. Berlin, *Ethnobiological Classification: principles of categorization of plants and animals in traditional societies* (Princeton, N.J: Princeton University Press, 1992), 65-68.

²⁵ Cecil H Brown, "Folk classification: an introduction," In *Ethnobotany: a reader*, ed. Paul E. Minnis, (Norman, Oklahoma: University of Oklahoma Press, 2000), 65-68.

single folk name may lump together different botanical species²⁶. For example, the popular name ‘angelim’ refers to a whole range of species belonging to different botanical genera, such as *Andira*, *Amburana*, *Dinizia*, *Hymenolobium*, *Pithecelobium*, *Platycyamus*, *Vatairea* and *Vatareopsis*²⁷, which though are all members of the Leguminosae family. Other folk names may even span several families or increase complexity by being binomial or multiple, indicating different characteristics of a plant group. For example, ‘canela’ (‘cinnamon’) is a folk name mostly associated with plants from the Lauraceae family, which comprises many genera and species. Correspondingly, several binomial folk names can be found for canela, such as canela-amarela (yellow-cinnamon), canela-preta (black-cinnamon), canela-sassafras (sassafras-cinnamon), while the botanical species corresponding to them may or may not belong to the Lauraceae family.

Besides problems with translation and correlation, vernacular terms themselves may not be unambiguous. Several terms may thus be applied simultaneously for the same taxon within one region, or consecutively over time. This effect is multiplied when several languages occur simultaneously or sequentially, as in colonial Brazil, where indigenous, African and European languages were spoken. Assuming a uniform vernacular taxonomy may therefore obscure local or temporal idiosyncrasies and thus wrongly imply that a term would denote the same taxon throughout the region or across time. Furthermore, different speakers of the same language may disagree over the semantics of individual terms, complicating matters further. Not least, any such variation tends to remain obscure to the modern observer, as none of the rigid documentation processes are applied to popular language use that keep a taxon traceable in science.

Bearing these complications in mind, we proceeded with Steps 2a-f of our protocol. First, we extracted data on timber used for construction from our 15 key sources (Step 2a). Next, we selected the vernacular names of timber species cited in at least two of these sources (Step 2b), which yielded a total of 129 taxa. These most

²⁶ J.A.A. Camargos et al., *Catálogo de árvores do Brasil* (Brasília: Instituto Brasileiro do Meio Ambiente e Recursos renováveis, Laboratório de Produtos Florestais, 2001).

²⁷ Calvino Manieri, and Leonardo B. Primo, “Madeiras denominadas ‘angelins’, estudo anatômico macro e microscópico,” *Anu. Bras. Econ. Flor.* 19, (1968): 39-87.

widely mentioned taxa were then correlated to all possible scientific counterparts (Step 2c). For this, we consulted the following works, searching each manually for any of the 129 popular names extracted before: Le Cointe (1934)²⁸, Sampaio (1949)²⁹, Tavares (1959)³⁰, Corrêa (1941)³¹, Manieri et al. (1983)³², Camargos et al. (2001)³³, Barros and Callado (1997)³⁴, Barros et al. (2001³⁵, 2008³⁶), Carvalho (2003³⁷, 2006³⁸, 2008³⁹). Upon this operation, we arrived at a correspondence list of at least 620 possible tree species recognized botanically and native to Brazil.

We then brought this species list up to date (Step 2d). The works we had consulted in the previous step to correlate vernacular and scientific names are products of their time. Botanical taxonomy, however, is constantly changing and evolving according to new findings, which may alter a species' name and/or place within the botanical families. To update the 620 scientific names, their authors and their geographical distribution accordingly, we referred to the List of Brazilian Flora⁴⁰. Next, we analyzed the geographical distribution of the 620 species (Step 2e), found that 30% occurred outside the Atlantic Forest domain and disregarded them for the analysis. This left us with 445 species corresponding to 126 vernacular taxa. We assigned conservation status to these (Step 2f) based on the endangered flora lists of

²⁸ Paul Le Cointe, *A Amazônia brasileira III- Árvores e plantas úteis do Brasil* (São Paulo: Companhia Editora Nacional, 1934).

²⁹ Alberto José de Sampaio, "Nomes vulgares de plantas do Distrito Federal e do Estado do Rio de Janeiro," *Boletim do Museu Nacional: Botânica*, n. 4 (1946): 1-149.

³⁰ Sergio Tavares, *Madeiras do nordeste do Brasil* (Recife: Universidade Rural de Pernambuco, Ministério da Agricultura, 1959).

³¹ Manoel Pio Corrêa, *Dicionário das plantas úteis do Brasil e das exóticas cultivadas* (Rio de Janeiro: Ministério da Agricultura, 1941).

³² Calvino Manieri et al., *Manual de identificação das principais madeiras comerciais brasileiras* (São Paulo: IPT, 1983).

³³ J.A.A. Camargos et al., *Catálogo de árvores do Brasil* (Brasília: Instituto Brasileiro do Meio Ambiente e Recursos renováveis, Laboratório de Produtos Florestais, 2001).

³⁴ Claudia F Barros, and Catia H. Callado, *Madeiras da Mata Atlântica: anatomia do lenho de espécies ocorrentes nos remanescentes florestais do Estado do Rio de Janeiro – Vol I* (Rio de Janeiro: Instituto de Pesquisas Jardim Botânico do Rio de Janeiro, 1997).

³⁵ Claudia F Barros et al., *Madeiras da Mata Atlântica: anatomia do lenho de espécies ocorrentes nos remanescentes florestais do Estado do Rio de Janeiro – Vol II* (Rio de Janeiro: Instituto de Pesquisas Jardim Botânico do Rio de Janeiro, 2001).

³⁶ Claudia F Barros et al., *Madeiras da Mata Atlântica: anatomia do lenho de espécies ocorrentes nos remanescentes florestais do Estado do Rio de Janeiro – Vol III* (Rio de Janeiro: Instituto de Pesquisas Jardim Botânico do Rio de Janeiro, 2008).

³⁷ Paulo E. R. Carvalho, *Espécies Arbóreas Brasileiras. Volume 1* (Brasília: Embrapa informação e Tecnologia; Colombo, PR: Embrapa Floresta, 2003).

³⁸ Paulo E. R. Carvalho, *Espécies Arbóreas Brasileiras. Volume 2* (Brasília: Embrapa informação e Tecnologia; Colombo, PR: Embrapa Floresta, 2006).

³⁹ Paulo E. R. Carvalho. *Espécies Arbóreas Brasileiras. Volume 3* (Brasília: Embrapa informação e Tecnologia; Colombo, PR: Embrapa Floresta, 2008).

⁴⁰ Flora do Brasil 2013 under construction. Accessed February, 2013, <http://floradobrasil.jbrj.gov.br/>.

the International Union for Conservation of Nature and Natural Resources (IUCN), the Environment Ministry of Brazil, and the Biodiversitas Foundation and found that 12% currently have conservation issues (threatened with extinction).

The complete list of species, which correlates folk and botanical names and inventorizes uses will be dealt with in a separate article. For the present paper, we will employ the overall results of Steps 2a–f as a reference point for our main focus: the historical data gathered in Step 2g regarding timber extraction, trade and legislation (summarized in Tables 01 and 02 below) and their correspondence with contemporary conservation issues.

TIMBER EXTRACTION IN THE COLONIAL PERIOD

In 1494, Portugal and Spain signed the Tordesillas Treaty, which divided between them all the lands recently and yet to be (re)discovered. Political pressures and incursions from other European nations, which challenged this Treaty, compelled the Portuguese to apply the principle of *uti possidetis* (literally: “use your possessions”)⁴¹. Henceforth, the colonizers needed to occupy and exploit the new lands, or they would forfeit their territorial claims. Until 1529, Brazil had seen but brief exploratory expeditions and occasional collection of brazilwood trees. This scenario changed when the use-it-or-lose-it approach to the colonies met with the crises of the Indian trade and the sugar mills on Madeira Island, another Portuguese colony. Thence commenced the first expeditions aimed at the colonization of Brazil⁴².

What started with brazilwood would soon expand to other timber species all over the coast^{43,44}, encouraging multiple ties – industrial and commercial, official and private – between Crown and Colony. Miller (2000) found that the largest concessions that exported timber to Portugal between 1796–1819 correspond to the modern states of Rio de Janeiro, Pernambuco, Bahia, Pará and Maranhão, contributing 39.2%, 24.3%,

⁴¹ Celso Furtado, *Formação econômica do Brasil* (São Paulo: Publifolha, 2000).

⁴² Antonio C. R. Moraes, *Bases da formação territorial do Brasil: o território colonial brasileiro no “longo” século XVI* (São Paulo: Hucitec, 2000).

⁴³ Lapa, *A Bahia*.

⁴⁴ Arquivo Histórico Ultramarino, BA_ Ofício da Comarca de Ilhéus (23/1/1799).

22.7%, 10.9%, and 2% of timber extraction, respectively⁴⁵. Carvalho (2006) estimates that two million brazilwood trees were felled in the first century of exploitation. The specific morphological characteristics of some timber species, such as fissured bark, thorns on the trunk, pigmented exudate (e.g. brazilwood), or considerable height (e.g. vinhático and jequitibá) might have facilitated their recognition in the forest, accelerating the process of identification and, consequently, the harvest. Just the sources we examined document 4,750,929 kg of brazilwood alone having been extracted between the years 1532 and 1814 (as calculated from the amounts shown in Table 01).

Table 01. Reports about the volume of Atlantic Forest timber extracted or commercialized in Brazil's colonial period.

Timber	Amount	Context	Reference
caixeta	42 trees	document informing the repair project of the frigate Nossa Senhora da Graça, Rio de Janeiro, with reference to the required timber	Arquivo Histórico Ultramarino, RJ_cx 101_D8053 (6/9/1771)
canella-do-pantano	54 trees	document informing the repair project of the frigate Nossa Senhora da Graça, Rio de Janeiro, with reference to the required timber	Arquivo Histórico Ultramarino, RJ_cx 101_D8053 (6/9/1771)
peroba	15 trees	trade letter about the cargo of the ship São Francisco Xavier going from Rio to Lisbon	Arquivo Histórico Ultramarino, RJ_cx 95_D8191 (10/24/1772)
brazilwood	58,700 kg*	license for the Count of Monsanto to bring this amount of brazilwood from Brazil for dyeing	Arquivo Nacional da Torre do Tombo, Armário jesuítico liv. 17, f.29. Library of Tombo (16?)
brazilwood	58,700 kg*	decree by King Alfonso V to his brother Peter allowing the annual extraction of this amount of brazilwood without paying taxes	Arquivo Nacional da Torre do Tombo, Manuscritos da livraria no. 168 (146). (08/21/1662)
brazilwood	1,200,000 kg	quantity exported to Portugal by Fernão de Noronha, who leased part of the Brazilian coast	Américo Vespúcio, <i>Novo Mundo: as cartas que batizaram a América. Apresentação e notas de Eduardo Bueno</i> . (São Paulo: Planeta, 2003).
brazilwood	816,869.2 kg*	quantity of timber from Bahia obtained by Casa da Índia ¹ from 2/17/1811 to 12/1814	Arquivo Nacional da Torre do Tombo, Conde de Linhares, MC 23/ 134 (1811-1814)
brazilwood	200 trees	amount obtained on a working day in the Jequirissá River in Bahia	Biblioteca Nacional do Rio de Janeiro, Manuscritos, Carta de Comércio (1782)
brazilwood	196,645 kg*	letter from the King to Diogo de Castro about the contract made with Fernando Lopes for the extraction of brazilwood	Biblioteca do Tombo (3/16/1630)
brazilwood	2,168,084.5 kg*	quantity of timber mentioned in House of India document ¹	Biblioteca Nacional do Rio de Janeiro, Manuscritos, Casa da Índia (1774)
brazilwood	244,779 kg*	quantity of timber awaiting exportation at the Real Warehouse of Rio de Janeiro	Arquivo Histórico Ultramarino, RJ_cx94_D8137 (4/4/1772)
brazilwood	3,688.3 kg*	royal order for the House of India ¹ to pay Gonçalo Dias 38,428 réis for this amount of wood	Arquivo Nacional da Torre do Tombo, Corpo cronológico, Parte 1, mç70, no. 15. (7/30/1541)

⁴⁵ Miller, *Fruitless tree*, 86.

brazilwood	3,463.3 kg*	document showing that João André, master of the ship of Salvador Afonso Torres, received this amount of timber from Gabriel Fernandes	Arquivo Nacional da Torre do Tombo, Corpo cronológico, Parte II, mc 173, no. 112. (1/31/1532)
cabriúva	18 dozen	trade letter about the cargo of the ship Santa Ana and Almas traveling from Rio to Lisbon	Arquivo Histórico Ultramarino, RJ_cx 95_D8205. (12/15/1772)
peroba	45 trees	document informing the repair project of the frigate Nossa Senhora da Graça, Rio de Janeiro, with reference to the required timber	Arquivo Histórico Ultramarino, RJ_cx 101_D8053 (6/9/1771)
sebastião-arruda	12,480 kg [#]	quantity of timber transported in the ship Santa Rosa and Senhor do Bom Fim	Arquivo Nacional da Torre do Tombo, Feitos e Findos, Juízo da Índia e Mina, mc 6, no. 10, c 314. (1775)
tapinoã	1032 trees	document informing the repair project of the frigate Nossa Senhora da Graça, Rio de Janeiro, with reference to the required timber	Arquivo Histórico Ultramarino, RJ_cx 101_D8053 (6/9/1771)
tapinoã	80 dozen planks	Antonio Marques Gomes's request to King John V soliciting provision to buy this amount of timber	Arquivo Histórico Ultramarino, RJ_cx 28_D2970 (3/1/1736)
tapinoã	8723 planks	Amount of timber at warehouse of Guinea and India and Ribeira das Naus	Arquivo Nacional da Torre do Tombo, vol. 68, f. 130 (1734-1737)
tapinoã	a few dozen barrels	quantity of wood requested by the Royal Navy ²	Biblioteca Nacional do Rio de Janeiro, Carta do Secretário de Estado Diogo da Mota Corte Real (1754)
tatajuba	360 logs	note on timber from Pernambuco for the ship Nossa Senhora do Bom Sucesso and São Bento	Arquivo Nacional da Torre do Tombo, Feitos e Findos, Juízo da Índia e Mina, mc 3, no. 1, cx 190. (1790)
vinhático	1500 planks and 400 axe handles	material for the Lisbon Arsenal ²	Biblioteca Nacional do Rio de Janeiro, Carta do Secretário de Estado Francisco Xavier de Mendonça Furtado (1760)
vinhático	34 trees	document informing the repair project of the frigate Nossa Senhora da Graça, Rio de Janeiro, with reference to the required timber	Arquivo Histórico Ultramarino, RJ_cx 101_D8053 (6/9/1771)

Fuente: Created by the authors.

Values marked with * indicate that the original values were expressed in quintais (one quintal = 58.7 kg); values marked with # indicate that the original values were expressed in arroba (one arroba = 15 kg).

1 Casa da Índia: Portuguese overseas trade organization.

2 These trees were felled in what is currently the state of Rio de Janeiro, more specifically in the northern Rio de Janeiro (Lisboa, Riqueza do Brasil; Cabral, Floresta, política e trabalho).

In our opinion, the ships' inventories are the best sources of information about the amount of timber exported from Brazil. They provide a readable, clear and accurate account of the quantities and qualities of the material transported. For example, one document from 1784 records the contents of hundreds of ships that sailed to Portugal that year, full of Brazilian timber. One of these ships, the *Compania Capitão M. Thomas Ribeiro MB*, recorded 121 different kinds of wood by its folk names, quantity and uses. In each of the other vessels, at least 30 types of timber and its uses were recorded, demonstrating the knowledge acquired by the colonizers about the local flora and revealing a large amount of timber exported (see Table 01).

Not least, the ships themselves represented a giant sink of forest resources. A 74-gun vessel needed at least 3.600 m³ of timber only for the ship's basic frame⁴⁶. Some species were highly sought after and had priority use in shipbuilding, such as: jequitibá-do-campo⁴⁷; óleo-vermelho for masts⁴⁸; copaíba for masts⁴⁹ and ship beams⁵⁰; peroba for straps and the ship's magazine; vinhático for keels, planks and canoes⁵¹. According to Lapa (2000), "there is no better wood that surpasses the vinhático in both repairing and manufacturing ships" (*our translation*)⁵².

Besides export and shipbuilding, Brazilian timber was used to build private and official houses in the colony, as well as for sugar and coffee mills. These building complexes required large amounts of wood for their construction as well as for maintenance and operation. Beyond timber, there would have been a constant demand for fuel, in the form of firewood or charcoal. Sugar mills, in particular, required a considerable amount of firewood to heat the furnaces used for refining sugar. Engemann et al. (2005) detail how a sugar mill in the state of Rio de Janeiro presented five main demands of wood for its operation: fences, construction of the house and mill, ox carts and sugar boxes, as well as fuel for the furnaces⁵³. While construction makes much more specific demands on the species used than fuel, both equally require wood – trees – and contemplating how much fuel would have been required over and above the timber might hint at the extent of forest resources exploited.

The information considered here indicates the knowledge acquired by the Portuguese about the natural resources in their colonies and confirms the extraction of native timber. Yet, no one knows for sure which species exactly and which volumes overall were extracted from the territory during the colonial period. What we could gather were the pieces of information displayed in Table 01.

⁴⁶ Miller, *Fruitless tree*.

⁴⁷ L.M. Hutter, "A madeiras do Brasil na construção de embarcações", *Rev. Inst. Est. Bras.* 26, (1986): 47-64.

⁴⁸ Biblioteca Nacional do Rio de Janeiro, Seção de Manuscritos. XXVI Carta de 1784, Rio de Janeiro.

⁴⁹ Miller, *Fruitless tree*.

⁵⁰ Corrêa, *Dicionário das plantas úteis do Brasil*.

⁵¹ C.G.M. Castro, "Providências interinas para a conservação das mattas e páos da costa desta capitania," In *Documentos interessantes* 44 (1915):187-88.

⁵² Lapa, *A Bahia*.

⁵³ Carlos Engemann et al., "As marcas das mãos", In *As marcas do homem na floresta: história ambiental de um trecho de Mata Atlântica*, ed. by Rogério Ribeiro Oliveira (Rio de Janeiro: PUC-RJ, 2005), 62-70.

1. LEGISLATION ON LOGGING AND TIMBER TRADE

In the first century of colonial Brazil, the abundance and diversity of tree species made for their liberal exploitation⁵⁴. By the middle of the 17th century, however, regulations, decrees and laws were already in place to curb the use of native timber⁵⁵. The species thus regulated would later become known as ‘madeiras de lei’ or ‘timber under the law’ whose use ought to be exclusive to the Portuguese Crown⁵⁶. The meaning of this term has changed over time, shifting from its original legal implication to a connotation of good quality⁵⁷.

Although the term is widely known today, there is no certainty that a single list of species did exist nor the amount of species on it. Our research found no such document, nor documents referring to it or reporting settlers’ knowledge of it, which suggests that either the list was small enough for everyone to remember, or so long that virtually all timber was for royal use^{58,59}, or that there was in fact no single list that would have applied universally. Indeed Cabral and Cesco (2007)⁶⁰ have argued for a flexible approach when dealing with the Crown’s legal arrangement regarding native trees during that time period. The choice of both trees and of legal enforcement might have been varied and adapted to local condition, and each captaincy or district might even have had its own, specific list.

The Crown's increasing desire to control the use of Brazilian forests had four main reasons. Firstly, some species became scarce due to intensive local use. Secondly, the military conflicts that preceded and followed the French Revolution increased demand for the wood needed for weapons, wagons and warships, as well as for fuel for heating and cooking for soldiers in Europe. Thirdly, the Lisbon earthquake, followed by the tidal wave and fire that destroyed the Portuguese capital in 1755,

⁵⁴ B.S. Lisboa, *Riqueza do Brasil em madeiras de construção e carpintaria oferecido a Vossa majestade Imperial*. Anais do Rio de Janeiro. Rio de Janeiro: Typographia Nacional, 1761.

⁵⁵ Siqueira, “Considerações sobre ordem em colônias”.

⁵⁶ Francisco Carlos T. da Silva, “Conquista e Colonização da América Portuguesa,” In *História geral do Brasil (da colonização portuguesa à modernização autoritária)*, ed. by Maria Y. L. Linhares (Rio de Janeiro, Ed. Campus, 1990), 15-68.

⁵⁷ Diogo de C. Cabral, and Susana Cesco, “Árvores do rei, floresta do povo: A instituição das ‘madeiras-de-lei’ no Rio de Janeiro e na ilha de Santa Catarina (Brasil) no final do período colonial,” *Luso-Brazilian Review* 44, n. 2 (2007): 50-86.

⁵⁸ Miller, *Fruitless tree*, 49.

⁵⁹ Castro, “Providências interinas”.

⁶⁰ Cabral, and Cesco, “Árvores do rei”.

generated a great need for timber for city reconstruction⁶¹. Finally, the Crown wanted to keep the stock of quality wood for its exclusive use. Thus, the Portuguese government issued decrees and laws that regulated the felling and selling of timber considered most important for construction (see Table 02).

Table 02. List of documents that regulate the exploitation and use of timber resources in Brazil's colonial period.

Regulation	Application
letter from Duarte Coelho (1535) ⁶²	indicates that " <i>brazilwood could not be sold or taken outside the domain, (...) and must maintain and preserve the wood on earth (...) could not be burned (...)</i> " (our translation)
royal charter (1542) ⁶³	regulates the cutting of brazilwood trees for the first time
Decree of Tomé of Souza (1548) ⁶⁴	prescribes the method for brazilwood extraction, " <i>with as little soil damage as possible</i> "
Brazilwood Law (1605) ⁶⁵	11 articles informing about the authorization and cutting of brazilwood
Decree (1738) ⁶⁶	prohibits the export of tapinoã and brazilwood, except for the construction of warships
Royal Charter (1773) ⁶⁷	prohibits the cutting of tapinoã and peroba
Royal Charter (1797) ⁶⁸	regulates the use of forests and various Brazilian timber trees, including peroba
Imperial Decree (1790) ⁶⁹	restricts the exploitation of jatobá
Royal Charter (1799) ⁷⁰	regulates logging, including the rule that jequitibá could only be cut if sold exclusively to arsenals to make ribs
Order (1801)	demands that the cutting of fine wood be avoided
Normative Instruction (1808) ⁷¹	additional articles on logging and forest conservation in Brazil
Law (1810) ⁷²	restricts felling of jatobá trees
Law (1818)	reserves the right to cut copaíba trees for the state

Fuente: Created by the authors.

Brazilwood was the first species to have its extraction and use regulated. In 1605, after several minor decrees, the Crown adopted the Brazilwood Law, a specific legislation with 11 articles on logging, penalizing non-compliance with death and land confiscation^{73,74}. The size of the penalty indicates the importance attained by this timber in the royal economy. Besides brazilwood, other timber species were also

⁶¹ Cabral, "Floresta, política e trabalho".

⁶² Carta de Duarte Coelho, Biblioteca Nacional do Rio de Janeiro, Seção de Manuscritos, 1535.

⁶³ Carta Real, Biblioteca Nacional do Rio de Janeiro, Seção de Manuscritos, 1542.

⁶⁴ Coleção das Leis da República Federativa do Brasil – v.1 (Ed. Imprensa Nacional, 1808).

⁶⁵ Fazenda, *Legislação Portuguesa*.

⁶⁶ Biblioteca Nacional do Rio de Janeiro, Decreto 46:284 (6/5/1738).

⁶⁷ Carta Régia de 8 de março de 1773, Anais do Arquivo Nacional, Códice 68, v.2.

⁶⁸ Biblioteca Nacional do Rio de Janeiro, Seção de Manuscritos, Carta Real (1797).

⁶⁹ Biblioteca Nacional do Rio de Janeiro, Seção de Manuscritos, Carta Real (1799).

⁷⁰ Biblioteca Nacional do Rio de Janeiro, Seção de Manuscritos, Carta Real (1799).

⁷¹ *Coleção das Leis da República Federativa do Brasil. v. 1* (1808). Ed. Imprensa Nacional.

⁷² Corrêa, *Dicionário das plantas úteis do Brasil*.

⁷³ Vieira Fazenda, "Legislação portuguesa relativo ao Brasil", *RIHGB* 105, (1929): 210-229.

⁷⁴ Bernardino José de Sousa, *O pau-brasil na história nacional* (Rio de Janeiro: Companhia Editora Nacional, 1939).

targeted by specific decrees and laws, such as tapinoãn, jequitibá, copaíba, peroba and vinhático.

What might pass as a conservation awareness policy was in fact a way to ensure exclusive exploitation by the Portuguese government. A 'conservation parenthesis' should be made regarding the use of brazilwood. The royal law that regulated its felling stipulated that the tree should not be burned or cut off entirely, in order to stimulate regrowth, demonstrating concern with the continuity of the species. However, for other species, no documents were found to support similar attitudes. Even so, the royal interest in high-quality timber was such that the Charter of March 13, 1797⁷⁵ stated that "all coastal forests belong to the Crown". By this move, the King limited the accumulation of capital that the settlers could obtain by extracting timber.

As landowners could not legally profit from logging trees on their land, they may have cleared the land for other income-generating activities, cutting down as much surrounding forest as possible⁷⁶. In a similar vein, Siqueira (2009) has argued that the attempt to organize brazilwood extraction and discipline locals with "methodic and centralized measures" of legal enforcement would actually have caused disorder, as the laws were unclear and collided with locals' dependence on land exploitation⁷⁷. While the royal preservation policy may appear extreme, some authors suggest that its implementation in the colony was impracticable, and that this legislation had less impact and was more flexible than supposed⁷⁸. Therefore, it might not have caused such a lashing reaction from the local landowners. However, letters to the King from the 17th century call for diligence against those who destroy, chop and burn quality timber⁷⁹, indicating that some deforestation did occur, which though might not have been directly linked to the royal legislation.

Beyond cases of local resistance, the extensive colonial territory might have posed difficulties in applying and enforcing the royal laws. Maybe in hinterland areas

⁷⁵ Biblioteca Nacional do Rio de Janeiro, Seção de Manuscritos, Carta Régia de 13 de março de (1797), Rio de Janeiro.

⁷⁶ Miller, *Fruitless tree*.

⁷⁷ Maria Isabel de Siqueira, "Considerações sobre ordem em colônias: as legislações na exploração do pau-brasil," *IHGB* 170, n.442 (2009): 125-140.

⁷⁸ Cabral, and Cesco, "Árvores do rei".

⁷⁹ Arquivo Histórico Ultramarino, Reino resgate_cx 9, massas 32 (19/1/1638).

the Portuguese forest bureaucracy did not arrive so easily. Conceivably, there could have been a vast network of subterfuge and strategies used by loggers and traders to circumvent the royal laws, with smuggling presumably a constant practice⁸⁰. Siqueira (2009) points out many colonial documents attesting the frequency of brazilwood contraband acquired by foreign countries⁸¹. The colony's forest managers themselves showed an excellent capacity for bending what was prescribed in the royal letters, the more so as the laws created overseas did not fit the local reality⁸². Molton (1978) describes how it was common for court administrators in Bahia to circumvent the system and the legal process, including the appropriation of workers' wages⁸³. But regardless of whether the laws were applied fully, their creation reflected the value attained by these raw materials and the interest in organizing the colony governments.

CONSERVATION IMPACT ON THE ATLANTIC FOREST

Logging affected first the coastal region and riparian forests, which served as gateways for the settlers and offered easy access for the timber harvest. Rivers and streams were used to transport timber to the ports, making the riverside forests particularly vulnerable. In 1618, the best brazilwood was found only 12 to 20 léguas (72 to 120 km) from the city of what is now Recife (Pernambuco State)⁸⁴.

By the late 18th century the Bahia region had less than 1/3 of its timbers after 200 years of exploitation, as indicated by priest Marcelino Francisco de Melo, who appealed to the Queen to stop the destruction of the forests and preserve the vegetation along the coast and rivers⁸⁵.

Other sites besides Bahia also felt the effects of forest exploitation. Once abundant, brazilwood was considered rare by the beginning of 17th century in the

⁸⁰ Arquivo Nacional da Torre do Tombo, Feitos Findos e, Diversos Mc 5, n ° 9 - (25/6/1806), Rio de Janeiro.

⁸¹ Siqueira, "Considerações sobre ordem em colônias".

⁸² Cabral, "Floresta, política e trabalho", 154.

⁸³ F. W. O. Molton, "The Royal timber in late colonial Bahia", *Hispanic American Historical Review* 58, (1978): 41-61.

⁸⁴ Yuri T. Rocha, "Distribuição geográfica e época de florescimento do Pau-Brasil (*Caesalpinia echinata* LAM. – Leguminosae)," *Revista do Departamento de Geografia* 20, (2010): 23-36.

⁸⁵ Arquivo Histórico Ultramarino, BA_cx 175, D13085 (1777).

current state of Rio Grande do Norte⁸⁶. Farms and villages in what is nowadays the state of Minas Gerais were gradually abandoned due to environmental degradation⁸⁷. Reports of species scarcity in what is currently the state of São Paulo (near Santos) were also recorded⁸⁸. Navy warehouses and the Army arsenal were often depleted of timber⁸⁹, and ships' skeletons sat in ports waiting to be finished due to the lack of specific timber⁹⁰.

Notwithstanding the quantity and quality of Brazilian timber, during the 17th and 18th centuries, there was still the need to import timber from New England and the Baltic, mainly for manufacturing the masts of large vessel⁹¹. Perhaps the reason was not wood scarcity at all, but a lack of understanding of how tropical forest is different from the temperate European forests. The great tropical biodiversity may have posed as an obstacle for the Europeans, who were used to harvesting homogeneous temperate forest. In temperate forest, biodiversity is lower than in the tropics, so trees from the same species tend to grow side by side, making it easy for the logging industry. In the Atlantic Forest, in contrast, biodiversity is immense, so species tend to grow in a scatter pattern which certainly imposes difficulties for harvesting^{92,93}. This characteristic, associated with limited access and ways of transportation, might have complicated logging activities in some areas along the Atlantic coast. Hence it might have been easier, and cheaper, to import certain timber from temperate forest.

Warnings and reports about timber shortages occurred alongside indications that forest resources were still abundant, especially in the south of the colony. Rocha (2010) found documents attesting to the extraction of brazilwood in the 17th and 18th centuries in the current state of Espírito Santos⁹⁴. A letter from 1799, written by Rio de

⁸⁶ Rocha, "Distribuição geográfica".

⁸⁷ José A. Pádua, *Um sopro de destruição* (Rio de Janeiro: Jorge Zahar, 2004).

⁸⁸ J. Gambier, *Memória acerca das madeiras do Brasil*. Manuscrito da Biblioteca Nacional, 1811, I-32,12,020, Biblioteca Nacional, Rio de Janeiro, RJ.

⁸⁹ Biblioteca Nacional do Rio de Janeiro, Seção de Manuscritos, I-11, 01, 019, p.9.

⁹⁰ Arquivo Histórico Ultramarino, Reino resgate_cx 3, massas 91 (17?).

⁹¹ Miller, *Fruitless tree*, 27.

⁹² Stephen Hubbell, "Tropical rain forest conservation and the twin challenges of diversity and rarity," *Ecology and evolution* 3, (2013):3263-74.

⁹³ Cabral, *Floresta, política e trabalho*.

⁹⁴ Rocha, "Distribuição geográfica".

Janeiro's Chancellor mentioned that good quality timber with easy access could be found 20 leagues from the village of São Gonçalo (Rio de Janeiro)⁹⁵. Excellent quality timber could still be found across the plains and in the mountains, as Consul Gambier pointed out in 1811. A survey commissioned and published on December 18th 1850 in the Commercial Journal reported the amount of timber available in a forest near Rio de Janeiro, including 149 individuals of araribá, 128 angelim, 282 braúna, and 316 sucupira, among others. These numbers are impressive because nowadays it is impossible to find this amount of native trees in Rio de Janeiro State or even in the entire of Brazil⁹⁶. At the turn of the 19th century, Rio de Janeiro imported about three times the number of axes as other northern states⁹⁷, suggesting the existence of vast forest resources and a prominent logging sector.

These documents indicate that forests could have persisted longer in the southern region, despite the warnings of timber shortage or environmental degradation mentioned above. One explanation for this might lie in the mountainous geography of the region, which may have acted as a barrier to exploitation. Another explanation may be that Portugal's logging focus was mainly on the northern states until the mid-seventeenth century, which left the southern regions comparatively free of royal interference during the early centuries of the colony⁹⁸.

Regardless of when and where the logging of Brazilian forests began and how it proceeded, all timber trees cited by their vernacular names in the Portuguese royal laws (brazilwood, copaiba, jatobá, jequitibá, peroba, tapinoãn, vinhático – [see Table 02]) can be identified with at least one potential scientific species recognized as endangered by the official lists consulted. In fact, of the 445 possible botanical species surveyed in this study, 49 (12%) are ranked on the lists of species with some degree of extinction threat.

The assessment of threat combines different analytical approaches depending on the institution that leads the analysis, and the scale considered (local, regional,

⁹⁵ Arquivo Histórico Ultramarino, RJ_cx 173, D12770 (8/3/1799).

⁹⁶ Veronica A. Maioli, "Uso de Madeiras em Construções Históricas da Mata Atlântica no Rio de Janeiro," (Ph.D. thesis, Instituto de Biologia Roberto Alcântara Gomes, Universidade Estadual do Rio de Janeiro, 2014).

⁹⁷ Miller, *Fruitless tree*.

⁹⁸ Miller, *Fruitless tree*, 87.

global). Generally, all evaluations compare the past condition of a species' population with projections into the future. The framework provided for IUCN⁹⁹ is composed of five criteria to determine if a taxon is under threat: a) population size reduction measured over the longer of 10 years or three generations; b) geographic range in the form extent of occurrence or area of occupancy; c) small population size and decline observed/estimated by the number of mature individuals in the population over time; d) very small or restricted population, also considering the number of mature individuals; e) quantitative analysis of different species data to predict the probability of extinction in the wild over the time. Any taxon matching even one of the five criteria will be considered threatened. The 49 taxa identified in our study as threatened conform to one or more of the criteria. The information we uncovered from the historical records indicates that the intensive use of timber and extensive deforestation in colonial times must have been directly responsible for this condition.

A good example of this relationship is the fate of the species *Mezilaurus navalium* (Allemão) Taub. ex Mez (tapinoãn), which, as its Latin name indicates, was much appreciated and sought for shipbuilding during the colonial period. According to the List of Brazilian Flora (2013), this species is endemic to the State of Rio de Janeiro¹⁰⁰. Andrada (1736) informs us that tapinoãn, although rare, occurred also in Pernambuco and Bahia¹⁰¹. Considering the complex relationship between vernacular and scientific names, we cannot, however, be certain that the tapinoãn mentioned by him is in fact *M. navalium*, since four other species of the genus *Mezilarus* also occur in the Atlantic Forest^{102,103}. In any case, it was already showing signs of shortages in the 18th century.

The Viceroy of Brazil reported in 1768 that tapinoãn was scarce due to unregulated cutting and reserved all available individuals for the exclusive use of the Royal Arsenal. Its timber became so rare that it could not be bought for any price.

⁹⁹ IUCN. *The IUCN Red List of Threatened Species – Version 2019-3*. Accessed January 2020. <http://www.iucnredlist.org>.

¹⁰⁰ Flora do Brasil 2013 under construction.

¹⁰¹ G. F. de Andrada, *Relações parciais enviadas ao Rei*, 28 de Julho de 1736, *Anais do Arquivo Nacional do Rio de Janeiro*, Vice-Reinado, Cs. 745, pacote 1, Biblioteca Nacional, Rio de Janeiro.

¹⁰² Flavio M. Alves, "Estudos taxonômicos e filogenéticos de *Mezilaurus* Taub. (Lauraceae) lato sensu e restabelecimento de *Clinostemon* Kuhl. & A. Samp," (Ph.D. thesis, Instituto de Biociências da Universidade do Estado de São Paulo, 2011).

¹⁰³ Flora do Brasil 2013 under construction.

Despite requests from the Companhia Geral de Pernambuco and Paraíba for purchase, it was no longer sold in Rio de Janeiro¹⁰⁴. Widely in demand, the lack of this timber caused delays in shipbuilding¹⁰⁵. The species was considered extinct in the 20th century, after it had not been sighted in the wild for 40 years (1947–1987)¹⁰⁶. Only when a small population of tapinoãn was discovered in a Biological Reserve (in Rio de Janeiro), its conservation status was changed from extinct to vulnerable¹⁰⁷.

The case of tapinoãn illustrates how utility, historical exploitation and contemporary conservation are intricately connected, and how archival records can provide a glimpse of the dynamics at play. As with tapinoãn, selective extraction led to regional extinction of several other species even in the colonial period and transformed forest composition to the present day^{108,109}. Less than 200 years passed from the vast and endless forest described by the early colonizers, to the fear of wood shortages still in colonial Brazil. The extensive exploitation of the Atlantic Forest's timber resources throughout the colonial period certainly contributed to the current state of the vegetation, where many of the species abundant in the past are now rare and threatened in their natural habitats. The rationale of *uti possidetis*, which drove so much of this dynamic, can likewise be observed in land use today. Landowners in Brazil clear forest and place cattle on the land to mark it as theirs. Conservation issues are implicit in this use-it-or-lose-it-approach.

FINAL REMARKS

Our archive search produced a significant amount of documents relating to the extraction and use of timber in the colonial period. Forging a coherent narrative from these documents proved difficult, however, as textual information is sparse, dispersed, disconnected and often contradictory. Some documents, for example,

¹⁰⁴ Arquivo Histórico Ultramarino, RJ_cx 78, D7071 (8/3/1766).

¹⁰⁵ Arquivo Histórico Ultramarino, RJ_cx 84, D 7474 (4/8/1768).

¹⁰⁶ José Elias de Paula, and José Luiz de H. Alves, *Madeiras Nativas- anatomia, dendrologia, dendrometria, produção e uso* (Brasília-DF: Fundação Mokiti Okada, 1997).

¹⁰⁷ International Union for Conservation of Nature and Natural Resources, *Red List*.

¹⁰⁸ João R. Stehmann et al., *Plantas da Floresta Atlântica* (Rio de Janeiro: Instituto de Pesquisas Jardim Botânico do Rio de Janeiro, 2009).

¹⁰⁹ Diogo de C. Cabral, "O bosque de madeiras e outras histórias: a Mata Atlântica no Brasil colonial (séculos XVIII e XIX)," (Ph.D. thesis, Instituto de Geociências e Departamento de Geografia da Universidade Federal do Rio de Janeiro, 2012).

indicated environmental degradation, while others implied vast forest resources for the same period. What the documents did offer was extensive information about trees from the Atlantic Forest used for construction, reflecting also the great need for shipbuilding during the period.

We capitalized on this wealth, mining from the documents a large dataset on timber trees. Generating this dataset relied on the careful consideration and comprehensive evaluation of sources, with meticulous extraction and analysis of relevant information according to a standardized protocol – schematically presented in the methodological flowchart of Figure 1. The central element of the dataset are the folk names for timber trees quoted in the historical records. By denoting tree species recognized by science today, they furnish a link between past and present. They enable us thereby to correlate historical records on timber use and extraction on the one hand, and contemporary data on species distribution and conservation on the other, permitting an integration of historical and biological science approaches. While our study has focused specifically on timber trees and the Atlantic Forest, the methodology we have used would be applicable more widely in the fields of history and ecology.

The dataset indicated kinds of uses and extent of extraction rather than overall volume of timber taken from the Atlantic Forest. It permitted us to infer that a great number of trees were known for their use in construction in the colonial period – notwithstanding records of imported wood for ships' masts, or lack of a proper forestry industry, or even the scatter pattern of tropical forest species. Furthermore, we found that all timber trees with regulatory laws from that period, the so called *madeiras-de-lei*, are also ones currently threatened with extinction. What we see now in the Atlantic Forest in terms of forest composition and species abundance is a direct reflection of past practices. And the colonial period played an important role in starting the extractive mind-set that continued until the Atlantic Forest was protected, centuries later, in 2006¹¹⁰.

¹¹⁰ Casa Civil, “Lei nº 11.428, de 22 de dezembro de 2006”, http://www.planalto.gov.br/ccivil_03/_Ato2004-2006/2006/Lei/L11428.htm.

ACKNOWLEDGMENT

This study was financed in part by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior – Brazil (CAPES) – Finance Code (BEX 10357/12-2), Conselho Nacional de Desenvolvimento Científico e Tecnológico – Brazil (CNPQ/PQ 310790/2011-5) and Fundação Carlos Chagas Filho de Amparo à Pesquisa do Estado do Rio de Janeiro – Brazil (FAPERJ E-26/101.459/2010-2014).

REFERENCIAS

Aguiar, Francismar Francisco Alves, Shoey Kanashiro, Armando Reis Tavares, Marcos Mecca Pinto, Giulio Cesare Stancato, Janaina de Aguiar, and Thais Denise Rodrigues do Nascimento. "Seed germination and seedling growth of *Caesalpinia echinata* Lam. (Brazilwood): shading effect." *Revista Árvore* 29, n. 6: (November/December 2005) 871-875. <http://dx.doi.org/10.1590/S0100-67622005000600005>.

Alves, Flavio Macedo. "Estudos taxonômicos e filogenéticos de *Mezilaurus* Taub. (Lauraceae) *lato sensu* e restabelecimento de *Clinostemon* Kuhl. & A. Samp.". Ph.D. thesis, Instituto de Biociências da Universidade do Estado de São Paulo, 2011.

Anais do Arquivo Nacional, Códice 68, v.2, Carta Régia (8 de março de 1773).

Andrada, G. F. de. Relações parciais enviadas ao Rei. 28 de Julho de 1736, Anais do Arquivo Nacional do Rio de Janeiro, Vice-Reinado, Cs. 745, pacote 1, Biblioteca Nacional, Rio de Janeiro.

Arquivo Histórico Ultramarino, Reino resgate_cx 9, massas 32 (19/1/1638).

Arquivo Histórico Ultramarino, Reino resgate_cx 3, massas 91 (17?).

Arquivo Histórico Ultramarino, RJ_cx 28_D2970 (3/1/1736).

Arquivo Histórico Ultramarino, RJ_cx 78, D7071 (8/3/1766).

Arquivo Histórico Ultramarino, RJ_cx 84, D 7474 (4/8/1768).

Arquivo Histórico Ultramarino, RJ_cx 101_D8053 (6/9/1771).

Arquivo Histórico Ultramarino, RJ_cx 95_D8191 (10/24/1772).

Arquivo Histórico Ultramarino, RJ_cx 95_D8205. (12/15/1772)

Arquivo Histórico Ultramarino, RJ_cx94_D8137 (4/4/1772).

Arquivo Histórico Ultramarino, BA_cx 175, D13085 (1777).

- Arquivo Histórico Ultramarino, BA_ Ofício da Comarca de Ilhéus (23/1/1799).
- Arquivo Histórico Ultramarino, RJ_cx 173, D12770 (8/3/1799).
- Arquivo Nacional da Torre do Tombo, vol. 68, f. 130 (1734-1737).
- Arquivo Nacional da Torre do Tombo, Chronological Body, Part II, mc 173, no. 112. (1/31/1532).
- Arquivo Nacional da Torre do Tombo, Chronological Body, Part 1, mç70, no. 15. (7/30/1541).
- Arquivo Nacional da Torre do Tombo, Armário jesuítico, liv. 17, f.29. Biblioteca do Tombo (16--).
- Arquivo Nacional da Torre do Tombo, Manuscritos da Livraria, no. 168 (146). (08/21/1662).
- Arquivo Nacional da Torre do Tombo, Feitos e Findos, Juízo da Índia e Mina, mç 6, no. 10, c 314. (1775).
- Arquivo Nacional da Torre do Tombo, Feitos e Findos, Juizo da Índia e Mina, mç 3, no. 1, cx 190. (1790).
- Arquivo Nacional da Torre do Tombo, Feitos Findos e, Diversos Mc 5, n ° 9 - (25/6/1806).
- Arquivo Nacional da Torre do Tombo, MC 23/ 134 (1811-1814).
- Bacha, Carlos José Caetano. "O uso de recursos florestais e as Políticas econômicas brasileiras - Uma visão histórica e parcial de um Processo de desenvolvimento". *Est. Econ.* 34, n. 2 (Apr/June 2004): 393-426. <http://dx.doi.org/10.1590/S0101-41612004000200007>.
- Barros, Claudia Franca, and Callado, Catia Henriques. *Madeiras da Mata Atlântica: anatomia do lenho de espécies ocorrentes nos remanescentes florestais do Estado do Rio de Janeiro - Vol I*. Rio de Janeiro: Instituto de Pesquisas Jardim Botânico do Rio de Janeiro, 1997.
- Barros, Claudia Franca, Callado, Catia Henriques, Marcon, M.L., Costa, C.G., Cunha, M. da., Lima, H.R.P., and Marquete, O. *Madeiras da Mata Atlântica: anatomia do lenho de espécies ocorrentes nos remanescentes florestais do Estado do Rio de Janeiro - Vol II*. Rio de Janeiro: Instituto de Pesquisas Jardim Botânico do Rio de Janeiro, 2001.
- Barros, Claudia Franca, Callado, Catia Henriques, Cunha, M.DA., Ferreira, M.L.M., Tamaio, N., Marquete, O., and Costa, C.G. *Madeiras da Mata Atlântica: anatomia do lenho de espécies ocorrentes nos remanescentes florestais do Estado do Rio de Janeiro - Vol III*. Rio de Janeiro: Instituto de Pesquisas Jardim Botânico do Rio de Janeiro, 2008.

- Berlin, B. *Ethnobiological Classification- principal of categorizations of plants and animals in traditional sciences*. Princeton, N.J: Princeton University Press, 1992. p. 65-68.
- Biblioteca Nacional do Rio de Janeiro, Seção de Manuscritos, I-11, 01, 019, p.9.
- Biblioteca Nacional do Rio de Janeiro, Seção de Manuscritos, Carta de Duarte Coelho (1535).
- Biblioteca Nacional do Rio de Janeiro, Decreto 46:284 (6/5/1738).
- Biblioteca Nacional do Rio de Janeiro, Seção de Manuscritos, Carta Real (1542).
- Biblioteca Nacional do Rio de Janeiro, Carta do Secretário de Estado Diogo da Mota Corte Real (1754).
- Biblioteca Nacional do Rio de Janeiro, Carta do Secretário de Estado Francisco Xavier de Mendonça Furtado (1760).
- Biblioteca Nacional do Rio de Janeiro, Manuscritos, Casa da Índia (1774).
- Biblioteca Nacional do Rio de Janeiro, Manuscritos, Carta de comércio (1782).
- Biblioteca Nacional do Rio de Janeiro, Seção de Manuscritos, XXVI Carta de 1784.
- Biblioteca Nacional do Rio de Janeiro, Seção de Manuscritos, Carta Régia de 13 de março de (1797).
- Biblioteca Nacional do Rio de Janeiro, Seção de Manuscritos, Carta Real (1799).
- Brown, Cecil H. "Folk classification: an introduction". In *Ethnobotany: a reader*, edited by Paul E. Minnis, 65-68. Norman, Oklahoma: University of Oklahoma Press, 2000.
- Cabral, Diogo de Carvalho. "Floresta, política e trabalho: a exploração da madeira". *Rev. Bras. Hist.* 28, n. 55 (Jan./June 2007): 217-241. <http://dx.doi.org/10.1590/S0102-01882008000100011>.
- Cabral, Diogo de Carvalho. "O bosque de madeiras e outras histórias: a Mata Atlântica no Brasil colonial (séculos XVIII e XIX)". Ph.D. thesis, Instituto de Geociências e Departamento de Geografia da Universidade Federal do Rio de Janeiro, 2012.
- Cabral, Diogo de Carvalho, and Cesco, Susana. "Árvores do rei, floresta do povo: A instituição das 'madeiras-de-lei' no Rio de Janeiro e na ilha de Santa Catarina (Brasil) no final do período colonial". *Luso-Brazilian Review* 44, n. 2 (2007): 50-86.
- Camargos, J.A.A., Czarneski, C.M., Meguerditchian, I., and Oliveira, D. de. *Catálogo de árvores do Brasil*. Brasília: Instituto Brasileiro do Meio Ambiente e Recursos renováveis, Laboratório de Produtos Florestais, 2001.

- Carvalho, Paulo Ernani Ramalho. *Espécies Arbóreas Brasileiras. Volume 1*. Brasília: Embrapa informação e Tecnologia; Colombo, PR: Embrapa Floresta, 2003.
- Carvalho, Paulo Ernani Ramalho. *Espécies Arbóreas Brasileiras. Volume 2*. Brasília: Embrapa informação e Tecnologia; Colombo, PR: Embrapa Floresta, 2006.
- Carvalho, Paulo Ernani Ramalho. *Espécies Arbóreas Brasileiras. Volume 3*. Brasília: Embrapa informação e Tecnologia; Colombo, PR: Embrapa Floresta, 2008.
- Casa Civil. 2006. Lei nº 11.428, de 22 de dezembro de 2006. http://www.planalto.gov.br/ccivil_03/_Ato2004-2006/2006/Lei/L11428.htm.
- Castro, C.G.M. "Providências interinas para a conservação das mattas e páos da costa de sta capitania". In *Documentos interessantes* 44 (1915):187-88.
- Conservation International. "Biodiversity hotspots". Accessed April, 2011. <https://www.conservation.org/priorities/biodiversity-hotspots>.
- Corrêa, Manoel Pio. *Dicionário das plantas úteis do Brasil e das exóticas cultivadas*. Rio de Janeiro: Ministério da Agricultura, 1941.
- Cronon, William. *Changes in the Land: Indians, Colonists, and the Ecology of New England*. New York: Hill and Wang, 2003.
- Engemann, Carlos, Silveira, Angela Maria Rosa da, Guimarães, Maria Aparecida de Oliveira, and Musitano, Mirtes Cavalcanti. "As marcas das mãos". In *As marcas do homem na floresta: história ambiental de um trecho de Mata Atlântica*, edited by Rogério Ribeiro Oliveira, 62-70. Rio de Janeiro: PUC-RJ, 2005.
- Fazenda, V. "Legislação portuguesa relativo ao Brasil". *RIHGB* 105, (1929): 210-229.
- Flora do Brasil 2013 under construction. Accessed February, 2013. <http://floradobrasil.jbrj.gov.br/>.
- Fundação Biodiversitas. Consulta a revisão da lista da Flora Brasileira ameaçada de extinção. Accessed January, 2011. http://www.biodiversitas.org.br/florabr/lista_florabr.pdf.
- Furtado, Celso. *Formação econômica do Brasil*. 27ª. Ed. São Paulo: Publifolha, 2000.
- Gambier, J. 1811. Memória acerca das madeiras do Brasil. Manuscrito da Biblioteca Nacional. I-32,12,020, Biblioteca Nacional, Rio de Janeiro, RJ.
- Giraud, Alejandro R. "Dynamics of biodiversity loss in the Argentinean Atlantic Forest: an introduction". In *The Atlantic Forest of South America: Biodiversity Status, Threats, and Outlook*, edited by Carlos Galindo-Leal, and Ibsen de Gusmão Câmara, 139-140. Washington: CABS and Island Press, 2003.
- Huang, Chengquan, Kim, Sunghee, Altstatt, Alice, Townshend, John R.G., Davis, Paul, Song, Kuan, Tucker, Compton J., Rodas, Oscar, Yanosky, Alberto, Clay, Rob, Musinsky,

- John. "Rapid loss of Paraguay's Atlantic Forest and the status of protected areas – a landsat assessment". *Remote Sensing of Environment* 106, (2007): 460–466.
- Hubbell, Stephen. "Tropical rain forest conservation and the twin challenges of diversity and rarity". *Ecology and evolution* 3, (2013):3263-74.
- Hutter, L.M. "A madeiras do Brasil na construção de embarcações". *Rev. Inst. Est. Bras.* 26, (1986): 47-64.
- Hutter, L.M. "O emprego da madeira e outras matérias-primas do Brasil na construção naval". *Rev. Soc. Bras. Pesq. Hist.* 26, n. 2 (2005): 15-51.
- International Union for Conservation of Nature and Natural Resources. *Red List of Threatened Species. Version 2011.2.* Accessed February, 2012. <http://www.iucnredlist.org>.
- IUCN. *The IUCN Red List of Threatened Species – Version 2019-3.* Accessed on January 2020. <http://www.iucnredlist.org>.
- Lapa, José Roberto do Amaral. *A Bahia e a carreira da Índia.* São Paulo: Cia Ed. Nacional, 2000.
- Le Cointe, Paul. *A Amazônia brasileira III- Árvores e plantas úteis do Brasil.* São Paulo: Companhia Editora Nacional, 1934.
- Lewis, G.P. *Legumes of Bahia.* Richmond: Royal Botanic Gardens Kew, 1987.
- Lins, Lívia Vannucci, Machado, Ângelo B. M., Costa, Cláudia M. R., and Herrmann, Gisela. "Roteiro metodológico para elaboração de listas de espécies ameaçadas de extinção". *Publicações Avulsas da Fundação Biodiversitas* 1, (1997): 1-50.
- Lisboa, B.S. Riqueza do Brasil em madeiras de construção e carpintaria oferecido a Vossa majestade Imperial. *Anais do Rio de Janeiro.* Rio de Janeiro: Typhographia Nacional, 1761.
- Maioli, Veronica Azevedo. "Uso de Madeiras em Construções Históricas da mata Atlântica no Rio de Janeiro". Ph.D. thesis, Instituto de Biologia Roberto Alcantara Gomes, Universidade Estadual do Rio de Janeiro, 2014.
- Manieri, Calvino, Chimelo, João Peres, and Alfonso, Verônica Angyalossy. *Manual de identificação das principais madeiras comerciais brasileiras.* São Paulo: IPT, 1983.
- Manieri, Calvino, and Primo, Leonardo B. "Madeiras denominadas 'angelins', estudo anatômico macro e microscópico". *Anu. Bras. Econ. Flor.* 19, (1968): 39-87.
- Marques, João Martins da Silva. *Descobrimientos Portugueses.* V.1. Lisboa: INIC, 1944.
- Miller, Shawn William. *Fruitless tree: Portuguese conservation and Brazil's colonial timber.* Stanford University Press: Stanford, California, 2000.

Ministério do Meio Ambiente - MMA. *Lista Oficial das espécies da flora Brasileira ameaçadas de extinção*. Diário Oficial da União, 185, Seção I, 2008, Instrução Normativa No. 6, 75-82.

Molton, F.W.O. "The royal timber in late colonial Bahia". *Hispanic American Historical Review* 58, (1978): 41-61.

Moraes, Antonio Carlos Robert. *Bases da formação territorial do Brasil: o território colonial brasileiro no "longo" século XVI*. São Paulo: Hucitec, 2000.

Oliveira, Rogério Ribeiro de, and Silva, Inês Machline. 2011. "História da paisagem e paisagens sem história: espécies exóticas e nativas manejadas na Mata Atlântica". In *Saberes e usos de plantas: legado de atividades humanas no Rio de Janeiro*, edited by Ariane Peixoto, and Inês M. Silva, 68-82. Rio de Janeiro: Editora PUC-Rio.

Pádua, José Augusto. *Um sopro de destruição*. Rio de Janeiro: Jorge Zahar, 2004.

Paula, José Elias de, and Alves, José Luiz de Hamburgo. *Madeiras Nativas- anatomia, dendrologia, dendrometria, produção e uso*. Brasília-DF: Fundação Mokiti Okada, 1997.

Ribeiro, Cezar Milton, Metzger, Jean Paul, Martensen, Alexandre Camargo, Ponzoni, Flavio Jorge, and Hirota, Marcia Makiko. "The Brazilian Atlantic Forest: How much is left, and how is the remaining forest distributed? Implications for conservation". *Biological Conservation* 142, n. 6 (March 2009): 1141-1153. <https://doi.org/10.1016/j.biocon.2009.02.021>.

Rocha, Yuri Tavares. "Distribuição geográfica e época de florescimento do Pau-Brasil (*Caesalpinia echinata* LAM. - Leguminosae)". *Revista do Departamento de Geografia* 20, (2010): 23-36.

Sampaio, Alberto José de. "Nomes vulgares de plantas do Distrito Federal e do Estado do Rio de Janeiro". *Boletim do Museu Nacional: Botânica*, n. 4 (1946): 1-149.

Silva, Francisco Carlos Teixeira da. "Conquista e Colonização da América Portuguesa". In *História geral do Brasil (da colonização portuguesa à modernização autoritária)*. Edited by Maria Yeadda Leite, 15-68. Rio de Janeiro, Ed. Campus, 1990.

Siqueira, Maria Isabel de. "Considerações sobre ordem em colônias: as legislações na exploração do pau-brasil". *IHGB* 170, n.442 (2009): 125-140.

Sos Mata Atlântica/Inpe/Isa. 2010. *Atlas dos remanescentes florestais da Mata Atlântica no período 2008-2010: dados parciais dos estados avaliados até maio de 2010*. São Paulo: Fundação SOS Mata Atlântica e Instituto de Pesquisas Espaciais, 2010.

Sousa, Bernardino José de. *O pau-brasil na história nacional*. Rio de Janeiro: Companhia Editora Nacional, 1939.

Stehmann, João Renato, Forzza, Rafaela Campostrini, Salino, Alexandre, Sobral, Marcos, Costa, Denise Pinheiro da, Kamino, Luciana H. Yoshino. *Plantas da Floresta*

Atlântica. Rio de Janeiro: Instituto de Pesquisas Jardim Botânico do Rio de Janeiro, 2009.

Tavares, Sergio. *Madeiras do nordeste do Brasil*. Recife: Universidade Rural de Pernambuco, Ministério da Agricultura, 1959.

Vespúcio, Américo. *Novo Mundo: as cartas que batizaram a América. Apresentação e notas de Eduardo Bueno*. São Paulo: Planeta, 2003.

Warren Dean. *A ferro e fogo: a história e a devastação da Mata Atlântica brasileira*. São Paulo: Cia. das Letras, 1996.

Exploración de Madera en Brasil Colonial: Una Perspectiva Histórica del Bosque Atlántico

RESUMEN:

La madera fue un importante recurso para la construcción del Brasil colonial, sin embargo la información sobre el tema es limitada. Usamos el material bibliográfico disponible y metodología interdisciplinaria, incluyendo métodos históricos, botánicos y etnobotánicos para investigar el uso de la madera nativa durante el periodo colonial y su relevancia para el estado de conservación actual del Bosque Atlántico. Un punto central de la metodología fue desarrollar un protocolo estandarizado enfocado en los nombres populares de los árboles, lo que permitió relacionar registros históricos con datos ecológicos. Aunque la información histórica es escasa, dispersa y a veces contradictoria, nuestro enfoque permitió demostrar el valor de algunas maderas y el impacto del extractivismo en los bosques locales. Se concluye que la extensa explotación de los recursos madereros del Bosque Atlántico durante el período colonial contribuyó a configurar el estado actual de la vegetación, donde muchas de las especies abundantes en el pasado, ahora son raras y amenazadas.

Palabras-clave: Bosque Atlántico; Historia Ambiental; Deforestación; Maderas de Ley; Leyes de Conservación de la Naturaleza; Extracción de la Madera.

Recibido:30/12/2019
Aprobado: 18/02/2020