Historical Wood Xylarium (JOlhw) in Brazil: A Strategy for Cultural and Forest Conservation

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Historical woods are one of the most important natural resources in the world. Known wood species used in the past can be an elementary key for understanding traditional communities or old societies, registering cultural expressions, and making strategies for forest conservation. In addition, this knowledge can contribute to cultural agencies' efforts in heritage preservation. On the other hand, the megabiodiversity found in tropical regions, such as Brazil, can pose an important challenge to successfully identifying wood species. In the rainforests of many regions, more than 450 wood species can be found, including trees and shrub components. Of this total, more than 100 species are used for cultural heritage. This number is incredibly higher than the usual number for cultural use in temperate regions. It is likely that many cultural species are still unknown. This paper introduces the concept of a collection specialized in cultural woods as a new frontier for the historical anatomy of tropical areas.

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Introduction

Tropical regions worldwide possess a megabiodiversity of woody species, including trees and shrubs (Giulietti *et al.* 2005). A global tree mapping study estimated that the Neotropical region contains approximately 23,000 woody species, out of a total of 60,065 species known to science. Tropical countries with rainforests, including Brazil (8,715 spp.), Colombia (5,776 spp.), Venezuela (6,656 spp.), Peru (4,439 spp.), and Ecuador (3,591 spp.), are among the 10 most tree-rich countries on the planet (Beech *et al.* 2017).

The Brazilian flora, notably possessing the highest number of tree species globally, is distributed across six biomes subject to three Köppen climate zones (A, B, and C) and twelve climatic types. The tropical climate (A) exerts the greatest influence, covering 81% of the country's territory, followed by the subtropical climate (C) at 14% and the semi-arid climate (B) at 5% (Alvares *et al.* 2013). The Amazon (4,948 tree species) and Atlantic Forest (3,416 tree species) biomes are the most biodiverse (Brazil Flora Group 2022) and are markedly influenced by climate A, with the exception of the Atlantic Forest in the southern part of the country, which is under the domain of climate B (Alvares *et al.* 2013). In this portion of the Atlantic Forest alone, 1,916 tree species are recognized (Bergamin *et al.* 2015).

Forests, People, and the Historical Use of Wood

Brazilian landscapes are ancient territories of interaction between trees and people, revealing mechanisms of interdependence with forests and the biocultural use of wood.

According to Melo Júnior *et al.* (2025), anatomical studies of wood reveal it to be a bioresource used in 14 categories of cultural use, encompassing 164 species prevalent in shelters and buildings, sacred statuary, means of transportation, structures, and furniture. Despite the increasing number of studies on historical woods in Brazil, the field of historical anatomy (Melo Júnior 2024) still lacks methodological depth, as the very richness of species makes taxonomic identification a complex task. Additionally, there are delays and greater imprecision in identifications due to the lack of specialized collections capable of gathering historical information associated with the data conventionally found in wood databases. In this context, we critique the traditional idea that biodiversity conservation and the protection of biocultural heritage should be treated separately, as they are interdependent and complementary (Bridgewater and Rotherham 2019).

Biocultural heritage constitutes a collective legacy built over millennia, articulating knowledge, practices, cultural values, and innovations, thereby sustaining interactions between human groups and biodiversity (Lindholm and Ekblom 2019). We understand that cultural memory is an important element that should be included in the set of information contained in collections of historical wood. According to Lindholm and Ekblom (2019), this memory can indicate changes in ecosystem processes (ecosystem memory); express practices materialized in the built environment (landscape memory); and comprehend relationships between the biological and the intangible, such as knowledge and practices (place memory). This leads us to the following question: Does a conventional wood collection effectively record information of this nature? We are certain that it does not.

Integrating these layers means recognizing that biocultural heritage extends beyond ecological knowledge of species. It encompasses the formation of landscapes and cultures, specific knowledge and practices, and living legacies of continuously transformed environments. Historical woods function as active repositories of biocultural information. They can accurately demonstrate the knowledge constructed by human cultures regarding wood diversity, technological choices, and the socio-environmental dynamics that reflect past forests. However, in practice, both wood collections and heritage actions reveal a gap that needs to be filled through the preservation of historical woods (Melo Júnior and Jaques-Gonçalves 2026). The collection of historical woods serves as a living instrument for safeguarding the country's biocultural memory, enabling an understanding of how the forest has been transformed into heritage and how that heritage can contribute to biodiversity conservation.

The Brazilian Wood Collections

There are 50 wood collections (xylaria) in Brazil, including both teaching and scientific collections. They are distributed throughout the country, with the highest concentrations in the North (14) and Southeast (12) regions, followed by the South (9), Central-West (8), and Northeast (7) regions (Miranda 2025; Oliveira *et al.* 2025; Oliveira 2025; Rocha 2025; Silva and Lima 2025) (Fig. 1). The largest scientific xylaria in the country are: the National Institute for Amazonian Research (INPAw) in the North; Sérgio Tavares (HSTw) in the Northeast; Calvino Mainieri (BCTw) in the Southeast; Harry van der Slooten (LPFw) in the Central-West; and Joinville (JOIw) in the South (Barros and Coradin 2015; Melo Júnior *et al.* 2014; Oliveira *et al.* 2025). Although the historical use of wood may be regarded as an important aspect of certain collections (Wiedenhoeft 2014), there are no records in Brazil of collections specifically dedicated to this subject.

The historical wood collection (JOIhw), established as a subcollection of the JOIw xylarium and created in 2026, provides open-access data through the Flora do Brasil

repository (JABOT), managed by the Rio de Janeiro Botanical Garden Research Institute. It is available at: https://joi.jbrj.gov.br/v2/consulta.php. Its creation addresses the need to incorporate, alongside the conventional records of a scientific xylarium, information on the traditional and historical knowledge and practices associated with wood, routes of circulation, categories of historical use, and other information that reflects ancestral human–forest relationships. Specific functions are assigned to this collection: (a) documenting the traditional knowledge and practices ("know-how") of traditional communities, Indigenous peoples, and historical settlements; (b) mapping the circulation of forest resources and the exchange of knowledge; (c) supporting biocultural heritage conservation and restoration initiatives; (d) reconstructing past forests; (e) understanding the influence of historical wood use on contemporary biodiversity conservation; and (f) applying data on past floristic composition to environmental restoration actions. The AI-assisted collection supports preliminary, non-destructive ID of wooden cultural heritage.

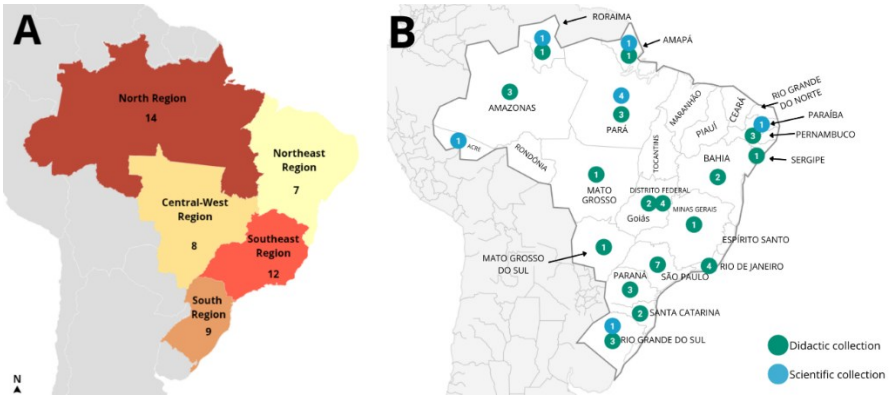

Fig. 1. Spatial distribution of Brazilian xylaria by region (A) and by Brazilian state (B)

Conclusion

Specialized collections of woods used in cultural contexts represent an important and innovative advancement in the fields of historical wood anatomy and the history of Brazilian xylaria. The JOIhw xylarium is a pioneering collection in Brazil. It marks a significant scientific and technological advancement in documenting and preserving evidence of the historical use of wood species in megadiverse countries such as Brazil. The collection expands the primary function of a conventional xylarium and creates new opportunities to strengthen initiatives to safeguard biocultural heritage and conserve biodiversity through a secure repository that documents forest composition in the historical past.

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