



## OVERVIEW OF COMMUNITY FOREST MANAGEMENT FOR LOGGING IN THE STATE OF AMAZONAS

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### ABSTRACT

**Objective:** Present an overview of the licensing of community timber forest management activities in the State of Amazonas between the years 2000 and 2021.

**Theoretical Framework:** This study addresses the topic of community-based timber forest management. It presents its history and evolution in the Amazon, addressing the main implementation difficulties, supporting legislation and the quantification of initiatives in the region.

**Method:** The present study is characterized by a qualitative and quantitative approach, using bibliographic and documentary research. A survey was carried out on community timber forest management activities in the State of Amazonas, using the information base provided by the Amazonas Environmental Protection Institute.

**Results and Discussion:** The results obtained revealed that between 2000 and 2021, 100 environmental exploration licenses were issued for community logging forest management, with projects located in 11 municipalities in the State of Amazonas, with emphasis on Maraã, Santo Antônio do Iça and Uarini. The total volume of licensed wood for the period was 68,122.43 m<sup>3</sup> and 10,242 trees were harvested, with emphasis on the species assacu (*Hura crepitans* L.), macacarecuia [*Eschweilera albiflora* (DC.) Miers] and mulateiro [*Calycophyllum spruceanum* (Benth.) K.Schum.].

**Research Implications:** Based on the understanding from bibliographical and documentary analyzes of community forest management activities, it is expected to contribute to the strengthening of a planning policy on the activity, both at the local and regional level.

**Originality/Value:** There is no unifying source of data on community forest management in the State of Amazonas that can generate consistent and updated statistics in a timely manner. In this way, the research aims to contribute to strengthening the activity at both local and regional levels, making community timber forestry management not just a simple supplier of raw materials, but linked to a wood production chain, generating high-value-added products, with raw materials of legal origin.

**Keywords:** Amazon Forest, Timber Forest Resources, Environmental Licensing, Wood Extraction.

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## PANORAMA DO MANEJO FLORESTAL COMUNITÁRIO MADEIREIRO NO ESTADO DO AMAZONAS

### RESUMO

**Objetivo:** Apresentar um panorama sobre o licenciamento das atividades de manejo florestal comunitário madeireiro no Estado do Amazonas entre os anos 2000 e 2021.

**Referencial Teórico:** O trabalho aborda a temática do manejo florestal madeireiro de base comunitária. Apresenta seu histórico e evolução na Amazônia, abordando as principais dificuldades de implementação, legislação de suporte e a quantificação das iniciativas na região.

**Método:** O presente estudo caracteriza-se por uma abordagem qualiquantitativa, utilizando-se a pesquisa bibliográfica e documental. Foi realizado um levantamento sobre as atividades de manejo florestal madeireiro comunitário no Estado do Amazonas, por meio da base de informações fornecidas pelo Instituto de Proteção Ambiental do Amazonas.

**Resultados e Discussão:** Os resultados obtidos revelaram que entre 2000 e 2021 foram emitidas 100 licenças ambientais de exploração para manejo florestal comunitário madeireiro, com projetos localizados em 11 municípios do Estado do Amazonas, com destaque para Marã, Santo Antônio do Içá e Uarini. O volume total de madeira licenciada para o período foi de 68.122,43 m<sup>3</sup> e 10242 árvores exploradas, com destaque para as espécies assacu (*Hura crepitans* L.), macacarecuia [*Eschweilera albiflora* (DC.) Miers] e mulateiro [*Calycophyllum spruceanum* (Benth.) K.Schum.].

**Implicações da Pesquisa:** Embasado no entendimento a partir das análises bibliográficas e documentais sobre as atividades do manejo florestal comunitário, espera-se contribuir para o fortalecimento de uma política de planejamento sobre a atividade, tanto em nível local quanto regional.

**Originalidade/Valor:** Não há uma fonte unificadora de dados sobre o manejo florestal comunitário no Estado do Amazonas que possa gerar em tempo hábil estatísticas consistentes e atualizadas. Desta forma, a pesquisa visa contribuir para o fortalecimento da atividade tanto em nível local quanto regional, fazendo com que o manejo florestal comunitário madeireiro não seja apenas um simples fornecedor de matéria-prima, mas que esteja interligado a uma cadeia produtiva da madeira, gerando produtos de alto valor agregado, com matéria-prima de origem legal.

**Palavras-chave:** Floresta Amazônica, Recursos Florestais Madeireiros, Licenciamento Ambiental, Extração de madeira.

## PANORAMA GENERAL DEL MANEJO FORESTAL COMUNITARIA MADERABLE EN EL ESTADO DE AMAZONAS

### RESUMEN

**Objetivo:** Presentar un panorama del licenciamiento de actividades de manejo forestal maderable comunitario en el Estado de Amazonas entre los años 2000 y 2021.

**Marco Teórico:** El trabajo aborda el tema del manejo comunitario de bosques maderables. Presenta su historia y evolución en la Amazonía, abordando las principales dificultades de implementación, apoyando la legislación y la cuantificación de iniciativas en la región.

**Método:** El presente estudio se caracteriza por un enfoque cualitativo y cuantitativo, utilizando investigación bibliográfica y documental. Se realizó un estudio sobre las actividades de manejo forestal maderable comunitario en el Estado de Amazonas, utilizando la base de información proporcionada por el Instituto de Protección Ambiental de Amazonas.

**Resultados y Discusión:** Los resultados obtenidos revelaron que, entre 2000 y 2021, se emitieron 100 licencias de exploración ambiental para el manejo forestal de explotación forestal comunitaria, con proyectos ubicados en 11 municipios del Estado de Amazonas, con énfasis en Marã, Santo Antônio do Içá y Uarini. El volumen total de madera licenciada para el período fue de 68.122,43 m<sup>3</sup> y se cosecharon 10.242 árboles, con énfasis en las especies



assacu (*Hura crepitans* L.), macacarecuia [*Eschweilera albiflora* (DC.) Miers] y mulateiro [*Calycophyllum spruceanum* (Benth.) K. Schum.].

**Implicaciones de la investigación:** A partir del conocimiento de análisis bibliográficos y documentales sobre las actividades de manejo forestal comunitario, se espera contribuir al fortalecimiento de una política de planificación de la actividad, tanto a nivel local como regional.

**Originalidad/Valor:** No existe una fuente unificada de datos sobre el manejo forestal comunitario en el Estado de Amazonas que pueda generar estadísticas consistentes y actualizadas de manera oportuna. De esta manera, la investigación pretende contribuir a fortalecer la actividad tanto a nivel local como regional, haciendo del manejo forestal maderable comunitario no sólo un simple proveedor de materias primas, sino vinculado a una cadena productiva de la madera, generando productos de alto valor agregado. con materias primas de origen legal.

**Palabras clave:** Selva Amazónica, Recursos Forestales Maderables, Licenciamiento Ambiental, Extracción de Madera.

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## 1 INTRODUCTION

Brazil is a country with the largest tropical forest area in the world, with around 498 million hectares, equivalent to 58% of the territory, covered by natural (98%) and planted (2%) forests. Brazilian natural forests are home to the greatest biodiversity on the planet, made up of several biomes, including the Amazon (Brazil, 2019).

The Amazon Biome covers an area of 4.2 million km<sup>2</sup>, corresponding to 49.3% of the national territory and 5% of the Earth's surface ( Artaxo , 2021; Brazil, 2019). It is home to the largest tropical forests on Earth and has proven to be an important carbon sink in recent decades (Gatti *et al.*, 2021), being the largest biome in Brazil, occupying almost half of the territory, and the world's largest biodiversity reserve. It has more than 10% of all species described in the world and numerous phytophysionomies (Marcovitch & Pinsky , 2016), having the most important river basin on the planet, with 17% of all existing freshwater (Becker, 2004).

Even though it has the countless benefits it provides to the planet and its residents and the immense potential to become a model of bioeconomy , it has been affected by countless problems, of which deforestation always stands out, which among several facets, transforms forests into pasture areas for extensive livestock farming (Ferreira *et al.*, 2021).

Thus, as a contribution to the better use of Amazonian forestry resources, this work is based on the assumption that bioeconomy initiatives can contribute to keeping the forest standing, conserving its biodiversity and alleviating socio-environmental inequalities (Miranda *et al.* , 2020), among which includes community-based timber forest management, not only



aiming to meet the demand for sawn or round timber (which generates few social benefits and has low added value), but rather management that is combined with the identification of the best way of industrializing wood and generating products with greater added value, aiming to achieve consumer acceptability, providing support for forestry exploration with social promotion and sustainability.

This type of forest management can be understood as the use and exploitation of forest resources by a collectively organized group that has rights over natural resources, with the fundamental purpose of improving the social, economic and environmental conditions of rural communities, carried out in small explored areas. (Soares *et al.* , 2022; Espada *et al.*, 2021; Miranda *et al.*, 2020; Espada *et al.*, 2017; Nascimento *et al.*, 2012; Amaral & Amaral Neto, 2005).

Therefore, this work is part of a doctoral thesis and aims to present the current panorama on the licensing of community timber forest management activities in the State of Amazonas between the years 2000 and 2021.

## 2 THEORETICAL FRAMEWORK

### 2.1 CONTEXTUALIZATION OF COMMUNITY WOOD FOREST MANAGEMENT

Forest management is considered a practice that combines the socioeconomic use of the forest, using it in a planned manner, with regard to its timber or non-timber products, aiming at its conservation for future generations. Brazil (2006) defines sustainable forest management (MFS) as the administration of the forest to obtain economic, social and environmental benefits, respecting the support mechanisms of the ecosystem subject to management and considering, cumulatively or alternatively, the use of multiple wood species, multiple non-timber products and by-products, as well as the use of other forest goods and services.

In relation to the occupation process and the Amazon economy, wood extraction is of great relevance, as it is the largest region that supplies the product to the Brazilian market (Azevedo-Ramos *et al.*, 2011).

MFS can be developed from both a business and community perspective, organized by families or communities.

Driven by pilot projects in the 2000s, the debate on Community and Family Forest Management grew, later defined through Decree No. 6,874/2009 as being “the execution of management plans carried out by family farmers, agrarian reform settlers and traditional



peoples and communities to obtain economic, social and environmental benefits, respecting the ecosystem support mechanisms”. This activity seeks to responsibly extract resources from the forest, without letting it end, while at the same time generating economic and social resources from this management for rural communities.

Despite the evolution in the number of Community Forest Management (MFC) initiatives in the Amazon, a series of difficulties have reduced those that are considered successful to a few dozen. Such difficulties are related to the fact that forest management is not a trivial activity. Problems such as the requirement for considerable investments, the lack of specialized technical assistance, restricted access to credit and the market, the lack of land and environmental regularization, and the lack of technical knowledge necessary for it to be carried out efficiently and with low impact (in a sustainable way), they burden the activity too much, especially when carried out by Amazonian communities (Espada *et al.* , 2021; Miranda *et al.*, 2020; Souza *et al.*, 2013; Amaral & Amaral Neto, 2005).

## 2.2 HISTORY AND EVOLUTION OF COMMUNITY TIMBER FOREST MANAGEMENT

Based on models of sustainable practices, combining conservation and generation of employment and income, Community Forest Management (MFC) emerges, where according to Waldhoff and Vidal (2019) and Soares *et al.* (2022), was defined for the first time, in legal terms, in 1994, through Decree No. 1,282, highlighting its principles and guidelines for the Brazilian Amazon.

In this way, with legal provisions, many community natural resource management projects were implemented in various locations in the region.

According to Miranda *et al.* (2020) and Amaral and Amaral Neto (2005), the MFC was first implemented by programs and projects developed by NGOs with communities, with funding from international cooperation, with its first workshop held in Acre, considered a milestone, as for the first time, technical representatives and community members met to discuss common problems that affected the implementation of management projects, proposing normative instructions ( INs ), which provided producers and local communities with the opportunity to formalize their forestry activities, through methodologies less bureaucratic when compared to business activities.

During this period, three normative instructions were created, as follows:

- ✓ IN NO. 04/1998 – Provides for community exploration and forest management and provides other measures;



- ✓ IN NO. 05/1998 – Provides for simplified forestry exploration and management and other measures;
- ✓ IN NO. 05/1998 – Provides for sustainable multiple-use forest management and other measures.

According to Espada *et al.* (2017), after the creation of the INs, the number of community and family forest management projects increased in rural settlements and protected areas, going from 218 projects in the 1990s to more than 1,100 in the years 2000 and 2006.

There were significant advances, however, INs were still not considered sufficient to meet all the diversity that exists in forest management carried out by communities. Thus, in 2001 the Community Forest Management Working Group was formed, resulting in the creation of the Public Forest Management Law (Law No. 11,284/2006). It defined the procedures for allocating public forests to local communities, including sustainable forest management as a productive activity, to generate income and promote improved quality of life for the populations living in these forests (Espada *et al.*, 2017).

Only in 2009 was the Federal Community and Family Forest Management Program created through Decree No. 6,874, executed by the Brazilian Forest Service. Other significant advances were made and, in 2011, IN No. was proposed. 16, which regulates the MFC in National Forests (FLONA), Extractive Reserves (RESEX) and in Sustainable Development Reserves (RDS), where ICMBio assumes the duty of analyzing, approving and supervising management plans (both timber and non-timber). Espada *et al.* (2017) states that this IN was created thinking about the management and commercialization of all forest products, being more applied to community wood management.

With this, the MFC has been promoting the conscious use of natural resources, as well as the responsible commercialization of forest products, thus contributing to the strengthening of increasingly sustainable standards.

## 2.3 COMMUNITY FOREST MANAGEMENT INITIATIVES IN THE AMAZON

According to Pinto *et al.* (2011), MFC actions were identified in the states of Acre, Amapá, Amazonas, Maranhão, Pará and Rondônia, totaling 902 initiatives that produce wood, 86% in the family or small-scale category and 14% in the community category, with all initiatives in the family/small scale category recorded are located in the State of Amazonas (almost 90%), followed by Pará (5.3%) and Acre (2.5%).



Pinto *et al.* (2011) emphasize that there is no unifying source of data on MFC that can generate, in a timely manner, consistent and updated statistics to support public policies, as the activity is still predominantly informal or, when there is some formalization required by a framework regulatory framework, there is no routine or institutional strategy for systematizing and making official data available to the interested public.

In research carried out in 2019 by the Community and Family Forest Management Observatory, only 122 initiatives were mapped in the region, even though the Amazon has around 41% of the total territory with community areas, where 50% are concentrated in the State of Pará and 28% in Acre, while Amazonas had only two projects and Rondônia and Amapá had one project each (Soares *et al.*, 2022; OMFCF, 2019).

### 3 METHODOLOGY

A bibliographical survey was carried out through bibliographical consultation in literature that deals with the topic presented in books, e-books and periodicals from specialized magazines (Marconi & Lakatos, 2021; Gil, 2018), aiming to deepen knowledge about the current stage of the use of timber forest resources in the State of Amazonas arising from community forestry management, which served to support the research and present a diagnosis of the current situation in the sector. The approach was qualitative and quantitative, using bibliographic and documentary research (Lima Júnior *et al.*, (2021), Gil (2018) and Santos (2011).

Data collection took place with the Forest Control Management of the Amazonas Environmental Protection Institute (IPAAM), a state body that is responsible for monitoring and licensing forest management activities, including those in the community category.

Data from the last 21 years were collected on the licensing of community forest management projects in the state of Amazonas, such as forest species licensed for felling (vernacular and scientific name), volume by species ( $m^3$ ), location of licensed projects (community and municipality), year of approval, main means of transporting wood/logs and main destinations for the raw material, thus composing a current panorama of the use of timber resources arising from community forestry management in the state of Amazonas, with historical and chronological analysis.

The data used came from “operating licenses” officially issued by the agency.

The description of the scientific names of licensed trees presented in the management plans were checked and standardized in accordance with the “Tropicos Project”, from the



Missouri Botanical Garden (Tropicos, 2012). Popular names not identified or validated with scientific names received the term “unidentified – NI”.

IPAAM is responsible for licensing and issuing authorizations for exploration in forest management areas in settlements, small properties and state conservation units, with Ibama and ICMBio responsible for licensing in federal conservation units, such as federal public forests, federal conservation (Santos, 2019). In this research, the data analyzed comes only from state licensing, under the responsibility of IPAAM.

## 4 RESULTS AND DISCUSSIONS

A list was presented with a total of 54 processes referring to associations that developed community timber forest management plans and requested licensing from the agency.

However, 20 processes were not located in the agency's archive, with only 34 being analyzed. Of these, each process normally splits into other secondary ones, which are filed in the same folder, cataloged by the name of the association. In this way, the 34 located were divided into 88 processes, as an association often held several different processes in a file folder.

Only projects registered as “community-based timber forest management” were requested, excluding those registered as “small scale” and “minor and major impact”. In personal communication with the Director of Forest Control Management at IPAAM, it was informed that currently almost all licensing processes for MFCM are analyzed in the “small scale” category, initially standardized by Ordinance/SDS/040/03, IN N° 01 /06 and later by IN N° 02/08, becoming CEMAAM Resolution N° 007 of July 21, 2011, for areas up to 500 ha.

It is worth clarifying that the term “small-scale producers”, according to Andrade (2014), encompasses a wide range of rural populations, with different classifications, such as small-scale producers (which, due to similarity of general characteristics, can include family farmers, peasants, settlers, landless people and farmers), extractivists (which may include riverside dwellers, rubber tappers and traditional populations), quilombolas and indigenous people, where community forest managers also fit in.

It is worth mentioning that in recent years, many associations started to submit projects in the “small-scale” management category and no longer in the community forest management category. Aiming for standardization, this research only addressed data from timber forest management projects developed by communities.

In some processes it can be seen that the license was issued, omitting information on the parameters: list of species, identification number of trees to be felled and number of individuals

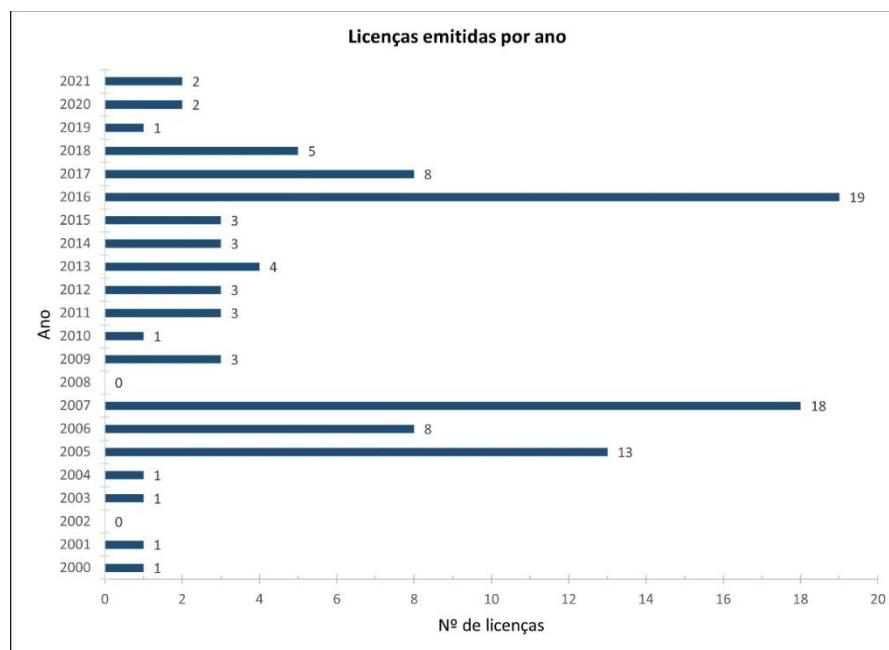


to be exploited. This gap was resolved after 2008, where the institute started to attach a document containing information with the parameters: popular name, scientific name, volume ( $m^3$ ), identification number of the trees to be explored and their respective quantities, in a to reduce the subjectivity of the plan that will be explored.

In the period between 2000 and 2021, 100 environmental exploration licenses were issued for community timber forest management, as shown in Figure 1. The data collected for the thesis were extracted from the licenses issued and not from the plan presented, considering that there may normally be divergence by those who analyze it and suggest the appointment of the normative act (operating license).

**Figure 1**

*Exploration licenses issued per year, in the period between 2000 and 2021.*



According to Figure 04, it can be seen that the years in which the most forestry exploration licenses were approved for timber management were in 2016, 2007 and 2005, with 19, 18 and 13 exploration licenses, respectively, making up 50% of the total number of licenses issued for the 21-year period. In the years 2002 and 2008, no licenses for logging for community management were issued, which could be justified by the fact that no data on the species to be exploited were found in the operating license, which was not computed in order to minimize error in the analyses. .



Regarding location, community forest management projects in the state of Amazonas were only licensed for 11 municipalities, with the majority present in the Solimões River channel (33 licenses) and Japurá (14 licenses), as described in Table 1.

**Table 1**

*Community forest management projects licensed in the state of Amazonas between 2000 and 2021.*

| County                  | River of influence <sup>4</sup> | Number of licensed projects |
|-------------------------|---------------------------------|-----------------------------|
| Maraã                   | Japurá                          | 14                          |
| Santo Antônio do Itá    | Solimões                        | 13                          |
| Uarini                  | Solimões                        | 11                          |
| Alvarães                | Solimões                        | 5                           |
| Good Source             | Solimões                        | 3                           |
| New Airão               | Rio Negro                       | 3                           |
| Boa Vista do Ramos      | Amazon                          | 1                           |
| Irlanduba               | Solimões                        | 1                           |
| Juruá                   | Juruá                           | 1                           |
| Nhamundá                | Amazon                          | 1                           |
| São Sebastião do Uatumã | Uatumã / Amazonas               | 1                           |
| TOTAL                   |                                 | 54                          |

According to Table 1, it is possible to state that 87% of community forestry management projects in the state of Amazonas, for the period 2000-2021, were explored in floodplain areas and only 13% in terra-firme areas. The projects were licensed in 43 communities within the 11 municipalities mentioned.

The total volume of licensed wood for the period was 68,122.43 m<sup>3</sup>, distributed among 10,242 individuals (trees) for exploration/killing, as shown in Figure 2.

<sup>4</sup>The item “river of influence” was adopted due to the fact that most community forestry management is carried out in floodplain areas, in addition to the fact that the river is the main logistical means of transporting wood to its destination.

**Figure 2**

*Volume of wood licensed for PMFC by municipality.*

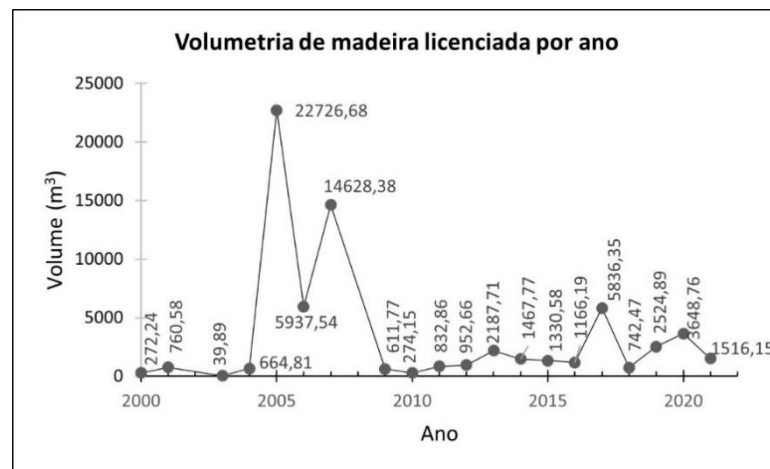


Of this total, the municipalities of Uarini and Maraã were responsible for around 77% of the explored volume, where Uarini alone makes up around 57% of the total. The municipalities with the lowest licensed volumes were São Sebastião do Uatumã, Nhamundá, Juruá and Iranduba, where together they are responsible for just 3.1% of the total volume. There is no clear reason, but it is inferred that it may be due to the organization of the associations, as the more organized they are from an administrative and technical point of view, the greater the approval of their plans. Furthermore, the management carried out in the floodplain environment receives assistance from technicians from the Mamirauá Institute for Sustainable Development (IDSM).

In relation to the volume of wood licensed annually, the years 2005 and 2007 account for almost 55% of the total licensed value in the period 2000-2021, with 22,726.68 m<sup>3</sup> and 14,628.38 m<sup>3</sup> respectively, as shown in Figure 3.

**Figure 3**

*Volume of wood from PMFC licensed between 2000 and 2021.*



There was an increase in the licensed volume in the first years after the beginning of legal activities of community timber forest management in Amazonas and, between 2009 and 2016, there was a significant drop in volume, reaching a new peak in 2017, falling again in the following years. .

This variation between rise and decline can be explained by the existence or absence of public incentives for the development of the activity, such as the former “Projeto Floresta Viva”, operated by the Amazonas Forestry and Sustainable Business Agency (Afloram), which was absorbed in 2007 by the Institute for Sustainable Agricultural and Forestry Development of the State of Amazonas (IDAM).

The Incentive Program for the Production of Managed Wood is currently in force, established through Decree No. 44,191 of July 12, 2021, popularly known as the “More Forest Management Program”, which regulates the incentive for the Production of Wood originating from Forestry Plans. Small-Scale Sustainable Forest Management (PMFSPE) and Sustainable Forest Management Plans with Lower Exploitation Impact (PMFS Minor Exploitation Impact) of the State of Amazonas, offering financing of up to R\$ 105,000.00, not being specific to communities, but rather to small individual producers, managed by the Rural Production Secretariat (SEPROR).

In relation to the volume of licensed wood per botanical family, those with the greatest participation were Euphorbiaceae (32,866.89 m<sup>3</sup>), Lecythidaceae (7,572.08 m<sup>3</sup>) and Rubiaceae (7,234.28 m<sup>3</sup>), shown in Table 2. These families have this greater share compared



to the stock that their species represent in the forest, taking into account that such families have individuals with large volumes of bole <sup>5</sup>.

Together, the Euphorbiaceae, Lecythidaceae and Rubiaceae families represent almost 70% of the families that had trees licensed for management, both in volume and number of individuals (trees), except for the Lauraceae family, which despite having a number of individuals (1270) larger than Rubiaceae (1961), it presented smaller volume.

It is worth noting that, for the Euphorbiaceae family, only 4 species were identified; for Lecythidaceae, Rubiaceae and Lauraceae, 9, 3 and 17 were identified, respectively (Table 2).

**Table 2**

*Volume of licensed wood per botanical family*

| N            | Family           | No. of Species | Volume (m <sup>3</sup> ) | No. of Individuals | Percentage (%) |
|--------------|------------------|----------------|--------------------------|--------------------|----------------|
| 1            | Euphorbiaceae    | 4              | 32,866.89                | 3069               | 48,247         |
| 2            | Lecythidaceae    | 9              | 7,572.08                 | 1289               | 11,115         |
| 3            | Rubiaceae        | 3              | 7,234.28                 | 1061               | 10,620         |
| 4            | Lauraceae        | 17             | 4,630.81                 | 1270               | 6,798          |
| 5            | Fabaceae         | 35             | 3,286.71                 | 727                | 4,825          |
| 6            | Malvaceae        | 9              | 2,646.36                 | 480                | 3,885          |
| 7            | Moraceae         | 9              | 2,635.89                 | 574                | 3,869          |
| 8            | Sapotaceae       | 4              | 1,429.22                 | 406                | 2,098          |
| 9            | Meliaceae        | 2              | 1,325.51                 | 282                | 1,946          |
| 10           | Myristicaceae    | 4              | 800.25                   | 166                | 1,175          |
| 11           | Goupiaceae       | 1              | 707.11                   | 171                | 1,038          |
| 12           | Picrodendraceae  | 1              | 662.52                   | 153                | 0,973          |
| 13           | Combretaceae     | 1              | 408.29                   | 117                | 0,599          |
| 14           | Anacardiaceae    | 4              | 346.08                   | 82                 | 0,508          |
| 15           | Melastomataceae  | 1              | 291.83                   | 63                 | 0,428          |
| 16           | Willow           | 1              | 177.6                    | 16                 | 0.261          |
| 17           | Chrysobalanaceae | 4              | 176.69                   | 55                 | 0.259          |
| 18           | Caryocaraceae    | 2              | 163.36                   | 21                 | 0.240          |
| 19           | Anisophylleaceae | 1              | 160.16                   | 50                 | 0.235          |
| 20           | Vochysiaceae     | 2              | 138.1                    | 16                 | 0.203          |
| 21           | Peraceae         | 1              | 93.3                     | 9                  | 0,137          |
| 22           | Olacaceae        | 2              | 71.35                    | 58                 | 0,105          |
| 23           | Bignoniaceae     | 3              | 64.6                     | 11                 | 0,095          |
| 24           | Apocynaceae      | 2              | 51.26                    | 18                 | 0,075          |
| 25           | Annonaceae       | 2              | 36.52                    | 18                 | 0,054          |
| 26           | Myrtaceae        | 1              | 28.83                    | 16                 | 0,042          |
| 27           | Simaroubaceae    | 1              | 28.65                    | 8                  | 0.042          |
| 28           | Clusiaceae       | 1              | 26.83                    | 7                  | 0.039          |
| 29           | Humiriaceae      | 1              | 25.56                    | 6                  | 0.038          |
| 30           | NI <sup>6</sup>  | 1              | 15.76                    | 16                 | 0.023          |
| 31           | Calophyllaceae   | 1              | 12.64                    | 5                  | 0.019          |
| 32           | Metteniusaceae   | 1              | 4.18                     | 1                  | 0,006          |
| 33           | Elaeocarpaceae   | 1              | 3.21                     | 1                  | 0,005          |
| <b>TOTAL</b> |                  | <b>132</b>     | <b>68.122,43</b>         | <b>10242</b>       | <b>100</b>     |

<sup>5</sup>Bole is a dendrological terminology that describes the part of the tree stem, devoid of branches and comprised between the ground and the main branches (branches).

<sup>6</sup>Unidentified botanical family.



Of the 32 families identified, 25 have a participation percentage of just 8.54% of the total volume of wood and individuals licensed for exploration. The largest volume of wood licensed for exploitation ( $62,302.43 \text{ m}^3$ ) is represented by 90 forest species and just 08 botanical families. This can be explained by the fact that several families have only a single species identified in the plans and there have been new systematic reviews in their identification, with emphasis on Cupiúba ( *Goupia glabra* Aubl .), formerly belonging to the Celastraceae family and currently incorporated into the Goupiaceae family .

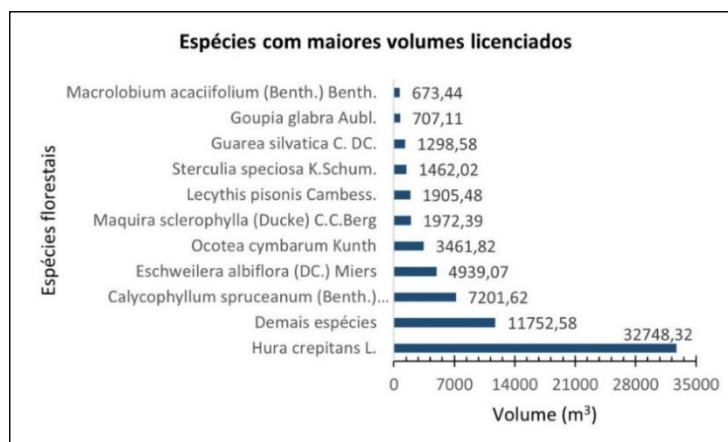
The Euphorbiaceae family encompasses more than 48% of the total volume due to the species Assacu ( *Hura crepitans* L.) which, alone, corresponds to around 33 thousand cubic meters of wood licensed for exploration. Three other species recorded in the plans and associated with the Euphorbiaceae family, such as: *Hevea spruceana* ( Benth .) Müll.Arg ., *Joannesia heveoides* Ducke and *Sapium hippomane* G. Mey , do not have a 0.5% share of the volume described for the family.

Lecythidaceae family , the species with the greatest representation was Macacarecuia [ *Eschweilera albiflora* (DC.) Miers ], with a volume equivalent to  $4,939.07 \text{ m}^3$  , followed by Sapucaia ( *Lecythis pisonis* Cambess .), with  $1,905.48 \text{ m}^3$  . It is worth mentioning that the genus *Eschweilera* is hyperdominant in the Amazon forest, being among the 2.2% of species that make up 50% of tropical trees in the biome (Cooper *et al.*, 2024). A few species are responsible for around 50% of the trees for the biome.

In relation to the Rubiaceae family, which has only three species described in the plans, the Mulateiro [ *Calycophyllum spruceanum* ( Benth .) K.Schum .] is responsible for  $7,201.62 \text{ m}^3$  of the licensed volume, considered the second species in terms of volume and number of individuals (1047). The mulateiro is common in floodplain forests in the state of Amazonas, being abundant in RDS Mamirauá (IDSM, 2014; Nascimento *et al.*, 2012; Ayres, 2006).

**Figure 4**

*Species with the highest volumes of licensed wood for the period 2000-2021.*



The Assacu ( *Hura crepitans* L.) (Figure 4) is also common in the floodplain forests of the state of Amazonas, being abundant in the RDS Mamirauá (IDSM, 2014; Nascimento *et al.*, 2012; Ayres, 2006) and in addition, it is a very useful species to riverside dwellers, being considered a light wood, with low density ( $0.4 \text{ g/cm}^3$ ) and due to the durability of its wood, which is widely used to support floating constructions (house model built on wooden logs that float along riverbanks and streams in the Amazon). On the market, it is used in civil construction for temporary use, being used for boxes, scaffolding and forms for concrete (Silva & Leão, 2006; Mady, 2000; Mainieri & Chimelo, 1989).

According to Cardoso *et al.* (2017) and Ter Steege *et al.* (2013), in the Brazilian Amazon there are between 4600 and 6000 cataloged tree species, but 5% of this total is not used, giving precedence to species selectivity (selective cutting), which in the future could put tree activity at risk. forest management, influencing natural regeneration, growth, recruitment and mortality of individuals (De Avila, 2017; Darrigo *et al.*, 2016; Schwartz, 2014).

Thus, it is possible to infer that community timber forest management in the state of Amazonas has greater activity in floodplain forest areas, given the participation of the largest volumes per species.

Even so, there are other initiatives in dryland forests, as in the case of RDS Uatumã – Comunidade de São Francisco das Chagas do Caribi, which has a community furniture store licensed and certified in 2021, with support from the Institute for Conservation and Sustainable Development of the Amazon (Instituto de Conservação e Desenvolvimento Sustentável da Amazônia) (IDESAM), through the Forest Cities Project, which is carried out with support from the Amazon Fund / BNDES, where they produce small objects and utilitarian wooden



artifacts ( POMs ), sold through a digital platform ( Inatu Amazônia) and a physical store in Manaus ( Idesam , 2022).

The management plan for the Community of São Francisco das Chagas do Caribi was initiated in 2018, being approved in 2020 and, in December 2021 alone, commercialization generated revenue of R\$13,300, benefiting five families in the community ( Idesam , 2022). In figure 5 it is possible to see the manufactured objects (A and B), such as candle holders, decorative vases, spoons, household and craft utensils, the solar oven (C) used to dry the wood and wooden blocks from the PMFC for unfolding. secondary (D).

**Figure 5**

*Products originating from PMFC in RDS Uatumã.*



Among the main wood species used in the development of products and artifacts are Angelim-pedra ( *Dinizia excelsa* Ducke ), Pied Angelim ( *Zygia racemosa* ( Ducke ) Barneby & JW Grimes ), Cumaru ( *Dipteryx odorata* ( Aubl .) Willd .), Cupiúba ( *Goupia glabra* Aubl .), Itaúba ( *Mezilaurus itauba* ( Meisn .) Taub . Ex Mez ), Jatobá ( *Hymenaea courbaril* L.), gamela laurel ( *Ocotea rubra* Mez ) and Black Sucupira ( *Diplotropis purpurea* ( Rich . Amshoff ). By the year 2023, the project has licensed 680.58 m<sup>3</sup> of wood.

In relation to the logistical transport of wood after felling, trees are normally transported in logs by river, on boats or even by raft (in the case of lowland species), which are not more common nowadays, and must be transported on rafts to your destiny.

Regarding the destination of the exploited trees, it was not clearly and objectively clarified in the post-exploration processes and final reports. Some initiatives highlight that they sold internally in the State, in their municipalities, often selling with local city halls or even to



other institutions. In other processes, there are reports of commercialization with old logging companies (2007) in the city of Manaus, now no longer active, located in the South Zone.

In relation to the commercialized price of round wood, there is only one process that describes the sale of around 56m<sup>3</sup> of Piquiá [ *Cayocar villosum* ( Aubl .) Pers ] worth R\$ 2,038.00 per cubic meter, totaling R\$ 114,128.00, coming from the municipality of São Sebastião do Uatumã.

In personal communication with technicians from the Mamirauá Institute , it was reported that wood harvested from communities was often acquired by the institute itself, to meet its internal demands.

## 5 CONCLUSION

In the State of Amazonas, the MFC represents a strategic modality, which translates into an opportunity for local communities and traditional people to develop their productive activities, collectively or individually, in balance with forest conservation.

In the period between 2000 and 2021, 100 environmental exploration licenses were issued for community logging forest management, where 87% of the projects were explored in floodplain areas and only 13% in terra-firme areas. Until 2008, the licensing body issued operating licenses omitting information on the parameters: list of species, identification number of trees to be felled and number of individuals to be exploited, which may have contributed to inefficient forest management.

Community forest management exploration licenses were issued for projects located in 11 municipalities in the State of Amazonas, with emphasis on Maraã, Santo Antônio do Iça and Uarini. The total volume of licensed wood for the period was 68,122.43 m<sup>3</sup>, distributed among 10,242 individuals (trees) harvested. Uarini and Maraã were responsible for around 77% of the explored volume. The municipalities with the lowest licensed volumes were São Sebastião do Uatumã, Nhamundá, Juruá and Iranduba, responsible for just 3.1% of the total volume.

The forest species with the largest volumes explored were Assacu ( *Hura crepitans* L.) with 33 thousand m<sup>3</sup>, Macacarecuia [ *Eschweilera albiflora* (DC.) Miers ], with 4,939.07 m<sup>3</sup> and the Mulateiro [ *Calycophyllum spruceanum* ( Benth .) K. Schum .] with 7,201.62 m<sup>3</sup>.

Regarding the limitations/difficulties of the research, it can be pointed out:

- Limited number of community forest management plans analyzed, made available by IPAAM, probably due to difficulties in organizing and archiving processes, as there is no routine or institutional systematization strategy;



- There is no unifying source of data on community forestry management in the State of Amazonas that can generate consistent and updated statistics in a timely manner, requiring a request to the agency for *on-site data collection* .

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