

## LATIN AMERICA AND THE CARIBBEAN

# MANOA: DEMONSTRATING THE VIABILITY OF FOREST MANAGEMENT IN THE BRAZILIAN AMAZON IN THE FACE OF PRESSURES

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|                       |                                                                                  |
|-----------------------|----------------------------------------------------------------------------------|
| NAME OF FOREST        | Manoa                                                                            |
| LOCATION              | Municipality of Cujubim, Rondônia State, Brazil                                  |
| AREA (ha)             | 74 039 (total area), 63 877 (certified forest)                                   |
| MANAGING ENTITY       | Manoa Sustentável Exploração e Serviços Florestais                               |
| MANAGEMENT OBJECTIVES | Sustainable timber production; generation of carbon credits; forest conservation |
| FOREST TYPE           | Natural tropical humid forest                                                    |

### 1. INTRODUCTION

The company Manoa Sustentável Exploração e Serviços Florestais (MANOA) was established in 1983, following the acquisition of approximately 74 000 ha of forest in the State of Rondônia, in Brazil's western Amazon, by Triângulo Pisos e Painéis Ltda.<sup>1</sup> MANOA is a pioneering case of SFM and was the first company to obtain forest certification in the state, where high rates of deforestation have been recorded for decades and informal and illegal forestry activities have prevailed.

The company's forest is located about 65 km from the city of Cujubim, in the municipality of the same name, and just over 250 km from the state capital, Porto Velho (**Figure 1**). The property is contiguous to Jamari and Jacundá National Forests and the Samuel Ecological Station, forming a large (480 000 ha) block of forest. In addition, it borders

rural settlements that have been expanding over the years as part of the agrarian colonization policy.

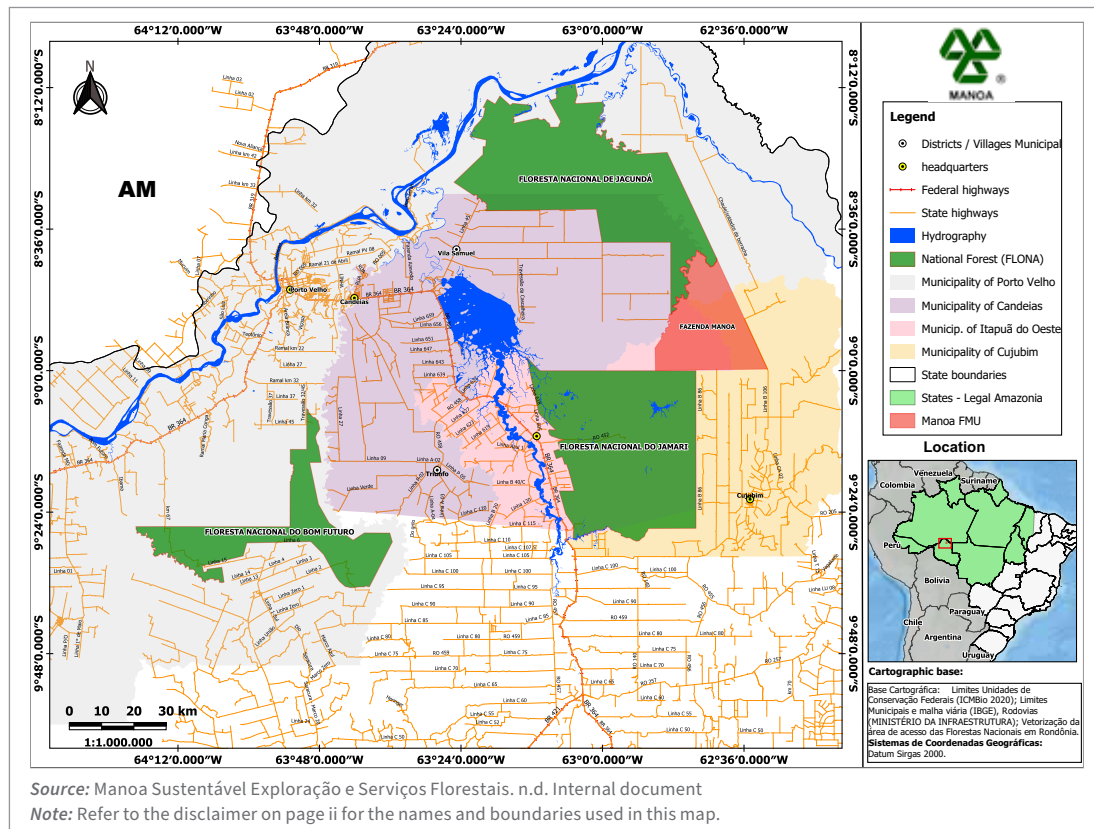
Forest in the area predominantly comprises lowland open ombrophilous forest and submontane open ombrophilous forest according to Brazilian classification.<sup>2</sup>

From the 1980s onwards, the municipality of Cujubim experienced a boom in logging activity, with more than 60 sawmills operating. The wood, coming mainly from extractivist settlements, was sold as logs or sawn timber in Rondônia and other states. In addition to logging, the base of the economy in the municipality – as well as in the region – has been and continues to be livestock farming, agriculture (mainly for cocoa, cassava and rice) for the local and regional markets, and the extraction of rubber (*Hevea brasiliensis*), açai palm (*Euterpe oleracea*) and

<sup>1</sup> The Triângulo Group ([www.triangulo.com.br](http://www.triangulo.com.br)), headquartered in Curitiba, Paraná, owns forestry projects in the southern and northern regions of Brazil, and has about 2 000 employees working in the production of compensated and laminated wood, sawn wood and flooring. Most of its production is destined for the foreign market.

<sup>2</sup> The most common species that characterize these forest types are *jequitibá* (*Cariniana* spp.), *roxinho* (*Peltogyne* sp.), *faveira* (*Dinizia* sp.), *angelim* (*Hymenolobium* sp.), *copaiba* (*Copaifera* sp.), *guariuba* (*Clarisia racemosa*), *maracatiara* (*Astronium lecontei*), *jatobá* (*Hymenaea stigonocarpa*), *freijó* (*Cordia goeldiana*), *tauari* (*Couratari* spp.) and *pino cuiabano* (*Schyzolobium amazonicum*).

**Figure 1.** Location of MANOA in the municipality of Cujubim, Rondônia State, Brazil



Brazil nuts (*Bertholletia excelsa*). In recent years, soybean monoculture has expanded dramatically.

MANOA's forest management plan was approved in 1994 (MANOA, 2018). In the early 2000s, the company suspended operations for several years because of difficulties of working with forest companies that did not meet the desired standards. After investing in training, equipment, machinery and infrastructure to reorient its production process towards the application of reduced impact management and sustainability precepts, MANOA obtained FSC forest management certification in 2005.<sup>3</sup> The company also certified its entire industrial chain, guaranteeing the origin and traceability of its production. In 2006, MANOA was also certified by the Brazilian Forest Certification Program.

## 2. KEY CHANGES AND DEVELOPMENTS

### 2.1. Management objectives

Industrial wood production has been maintained as the main management objective. The company decided to close its wood processing facilities in 2016, concentrating on forest management and supplying timber to the local market – the Municipality of Cujubim.

Another main objective is forest conservation, and in 2020, the company started generating income from carbon credits generated through a REDD+ project<sup>4</sup> certified under the Verra Carbon Standard. Each year, the company's forest management prevents the emission of 279 290 tonnes of CO<sub>2</sub>e, totalling 8.4 million tonnes of CO<sub>2</sub>e for 30 years.<sup>5</sup>

<sup>3</sup> 73 079 ha were certified, with 60 689 ha of effective management for forestry production. The remaining area, equivalent to 14.6 percent of the property, corresponded to protected areas.

<sup>4</sup> Projeto REDD+ Manóá (<https://registry.terra.org/app/projectDetail/VCS/1571>)

<sup>5</sup> For more information please visit <https://www.reddprojectsdatabase.org/view/project.php?id=819>

## 2.2. Type and condition of forest, and scale of operation

The area of forest under management has been maintained over the years, while neighbouring areas to the south, east and north have faced dynamic settlement expansion and the advance of the agricultural frontier. This can be seen in **Figure 2**, which juxtaposes satellite images taken in 2000 and in 2019. The expansion has even affected protected areas, such as the Samuel Ecological Station and the Jamari National Forest.

## 2.3. Legal status and management structure

The forest area is still owned by the company MANOA Sustentável Exploração e Serviços Florestais. Its organizational structure has not changed, except that it has not had a processing industry in Cujubim since 2016.

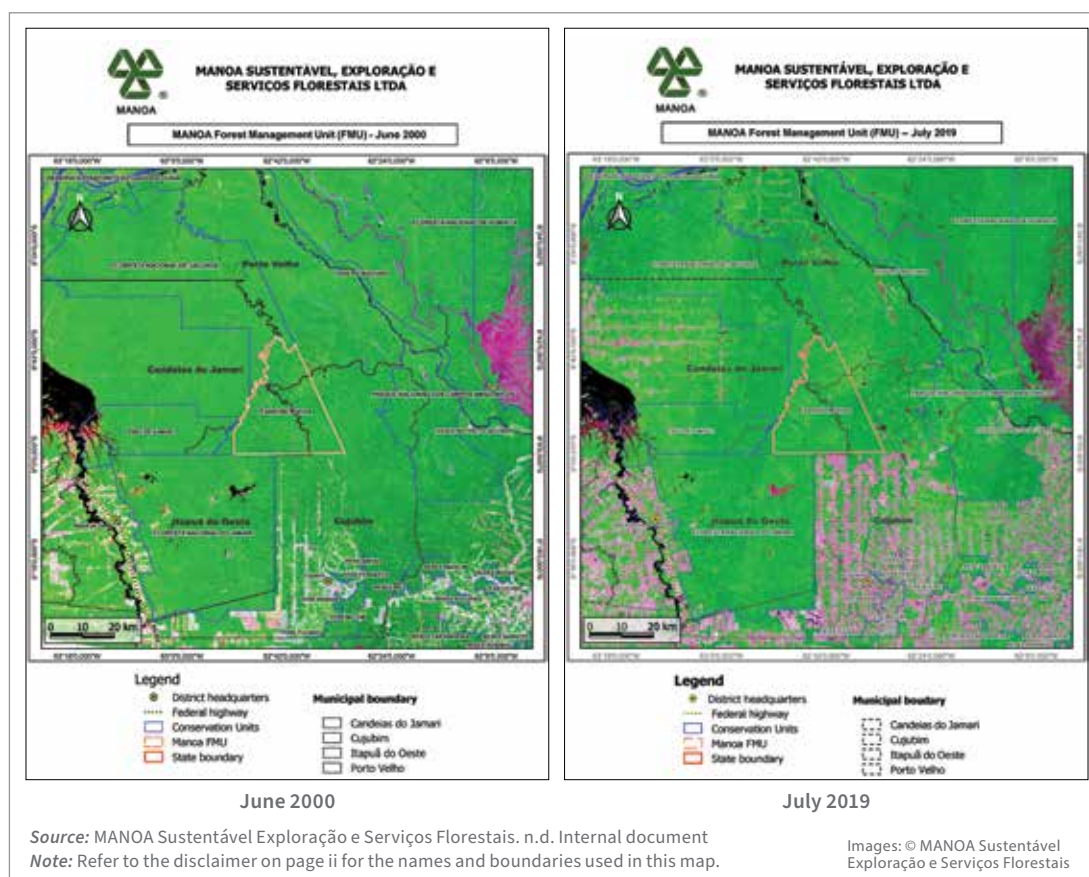
MANOA's forestry operations are conducted largely through two companies contracted for harvesting. In addition, it is advised by a consulting company (STCP Engenharia de Projetos), which provided assistance in preparing for forest certification.

## 2.4. Regulatory environment and government support

There have been several policy developments that have favoured forest management. Examples include the monitoring and control system that discourage deforestation and illegal timber extraction, and the standardization of wood-scaling procedures. In the case of forestry concessions, regulations became less cumbersome for operators.

MANOA has been contributing to the improvement of forest regulations through regular

**Figure 2.** Satellite images of the MANOA property and surrounding areas in 2000 and 2019, showing the considerable expansion of agricultural and settlement areas (in pink)



interactions with government officials. The company has hosted visits of officials to the forest areas and facilities, allowing them to observe the technical innovations, operational practices, and educational and training activities being implemented.

Inventory teams are provided with GPS devices that allow them to operate with cruising trails every 1 000 m during the 100 percent inventory or census, instead of opening trails every 50 m. In addition, the layout of skid yards has been changed from 20 x 25 m to 12 x 40 m, which facilitates the transport of logs and makes the operations more efficient.

MANOA has also played a role in improving the implementation of the Authorizations for Forest Exploration (AUTEX) by advocating for a more flexible approach. Previously, the rigid application of AUTEX required companies to predetermine which trees to harvest each year, resulting in heightened forest impact.<sup>6</sup> In response, the Secretary of State for Environmental Development (Secretária de Estado do Desenvolvimento Ambiental) in Rondônia enacted a regulation<sup>7</sup> allowing companies that met certain conditions to qualify for “full AUTEX.” This designation permits them to harvest the total volume specified in the forest inventory, affording them the liberty to select trees within that limit. Consequently, companies now have the flexibility to exclude species that lack a viable market in a given year.

## 2.5. Forest management practices

When the processing industry closed in 2016, the company turned its resources entirely to forest management, and, in 2018, it decided to carry out the harvesting operations itself instead of outsourcing them. Since then, MANOA has improved the quality of its operations, over which it now exercises greater control. These changes led to an increase in wood production from 35 000–40 000 m<sup>3</sup>

per year to 50 000–60 000 m<sup>3</sup> per year. The company had to invest in the purchase of timber extraction equipment, but the overall operational costs are less compared to contracting third parties. MANOA has a high-quality forest management plan thanks to advice received over the years from a specialized company (Brasil Florestal), based on analysis of data from forest inventories and permanent sample plots.

Key practices or measures that contribute to the quality of management and improved harvesting operations include the following:

- Detailed planning of operations starts the year before harvesting and is flexible enough to accommodate unforeseen operational as well as natural circumstances.
- The main logging roads are constructed one year before harvest, while secondary roads are opened during the harvest to avoid complications caused by heavy rain, which can hinder the operation of machinery.
- Although the minimum cutting diameter is 50 cm, forest inventory in the annual production unit includes all species above 35 cm in diameter in consideration of market variations (which define which species can be harvested) and silvicultural considerations (to better understand the population structure and productive capacity for the next felling cycle). On average, 70–75 percent of the trees marked for harvesting are cut, always keeping the extraction volume below 25 m<sup>3</sup> per hectare. In the annual production unit 11 (2022/2023), 32 species were harvested out of 97 species inventoried.
- A disciplined work schedule is followed that includes a defined daily production target (15 to 20 trees harvested per day, 80 to 100 m<sup>3</sup> of wood extracted per operator, with skidder capacity of 600 m<sup>3</sup> per day).

<sup>6</sup> In 2009, wood production was approximately 20 000 m<sup>3</sup> per year, distributed among 27 species, which represented only 4.7 to 6.8 percent of the total forest volume. The logs were transported from the forest to the MANOA processing facility in Cujubim. That industry consumed only six species, and the remaining 18 were sold as logs to other logging companies in the region.

<sup>7</sup> Portaria No. 087/GAB/SEDAM



*Top: A chainsaw operator felling a large tree in accordance with established guidelines*

*Bottom: A well-maintained main logging road to access annual production unit*

- Safety is highly valued and there have been no fatal accidents throughout MANOA's operations.
- The chainsaw operator has a GPS unit with a map indicating the locations of harvest trees, seed trees, rare tree species, trees for future harvest, and trees close to permanent protection areas and their buffer zones. The crew registers the felling direction and the direction in which to skid the trunks.
- Chainsaw operators make the final decision regarding the tree to be felled depending on factors such as the actual diameter, the presence of holes or deformity in the trunk, and the likelihood of causing collateral damage to residual trees around the harvest tree.

Road and bridge maintenance is the main post-harvesting operation. Harvesting is conducted with the least possible impact on the remaining tree population. Therefore, there is good potential for natural regeneration, and no post-harvesting silvicultural treatment is conducted.





To protect the forest area, there are surveillance posts in two critical sections of the forest management unit boundaries. Surveys are conducted approximately every 20 days. If any irregularities are detected, authorities are informed. Encroachment or unauthorized access is practically non-existent in the area. This is attributed to MANOA's long-standing policy of forging effective partnerships with the community and local stakeholders. The company has the necessary firefighting equipment; to date, there have been no problems with fires.

The monitoring system established by MANOA addresses operational activities and their impacts. Through standardized procedures and records, operations are constantly monitored, and the company can respond quickly to situations that require corrective measures.

MANOA has established permanent sampling plots to monitor all trees above 10 cm in diameter at breast height. Since 2014, ten sample plots have been installed as part of the company's REDD+ project, and another 36 plots are about to be installed to include increment measurements. Results to date indicate that the forest increment is much greater than 0.86 m<sup>3</sup> per hectare per year, which is the annual productivity for the group of commercial species.

## 2.6. Production and business aspects

MANOA currently produces 45 000–60 000 m<sup>3</sup> of timber per year, which is sold to some 20 companies in the local market in Cujubim. The supply of wood to the local industries is part of the company's policy to generate employment and benefits for the municipality and its inhabitants. Part of the sawn wood is sold to Triângulo Pisos e Painéis Ltda., which exports it with high added value.

Timber traceability is well-established, with clear procedures for recording and identification. The existing volume of wood by species is always known both in the different logging yards and the main yard. The staff at the office in the main yard have satellite internet and work with a digital system developed for MANOA and interconnected with the Documento de Origem Florestal (Document of Forest Origin). The records detail the entire chain of custody and the specifications of the wood that is shipped for each client.

Though the wood produced by MANOA is certified, local buyers are only interested in the guarantee of legal origin and not the SFM certification. The FSC certification does not result in price premium but gives the company credibility and respect. It also

*Logs being transported to the main logyard on a truck*





*Dormitories for employees  
at a permanent forest camp*

serves as a tool to “discipline itself” to maintain operational quality and sustainability standards.

A recent difficulty for the company’s business arose with the listing in the Convention on International Trade in Endangered Species of Wild Fauna and Flora<sup>8</sup> Appendix II of two commercially important Amazonian hardwoods, *cumaru* (*Dipteryx* spp.) and *ipê* (*Handroanthus* sp., *Tabebuia* sp.), which are highly valued as flooring wood and for outdoor use. The sales of these species have been affected as a result. All Triângulo clients have suspended the use of *cumaru*, and forest operators will probably have to stop extracting them due to restrictions they already face in the European market.

Sometimes, uncertainty in species identification generates problems in ensuring legal compliance and marketing of diverse timber species. MANOA is now considering hiring botanists to ascertain species names during forest inventory, which will increase costs. Avoiding the use of new, under-utilized species to circumvent this issue has implications for the management model, which endeavours to alleviate the pressure on species that have higher commercial demand by reducing their exploitation intensity.

## **2.7. Social aspects and impacts**

MANOA directly employs 50 to 60 people, all from Cujubim, and generates 500 jobs in the municipality. It is estimated that some 800 families depend on the company.

Most of the operating personnel are rehired from one harvest season to another. There is a certain loyalty to the company, since MANOA pays well above the average for the region and has a policy of appraising employees, promoting continuous improvements in the functions they perform, and enabling them to grow within the company.

All employees receive annual training courses on occupational health and safety, firefighting and prevention, and reduced impact use, among others. In addition, new personnel are trained in situ by the same experienced operators, which provides an effective process for assimilating good practices and operational skills.

MANOA provides lodging, food, life insurance and transportation for its employees. During the week, field personnel stay in the permanent camp in the forest which has solar panels, fuel, internet,

<sup>8</sup> For more information please visit [https://cites.org/sites/default/files/eng/cop/19/prop/as\\_received/E-Dipteryx\\_spp.pdf](https://cites.org/sites/default/files/eng/cop/19/prop/as_received/E-Dipteryx_spp.pdf).



a health post, television and other services and amenities. Personnel travel by bus from the work area to the camp (about 60 km); on weekends they are transported to Cujubim to be with their families.

The company has been supporting various social activities in the municipality from the outset. These include schools (e.g. the Raio de Luz Municipal School for Early Childhood Education), healthcare (e.g. the Mobile Care Service Emergency Department), sports and recreational activities, church, and local groups. In the last two years, MANOA's support to education, culture and recreation has benefited nearly 400 children and young people.

## 2.8. Environmental values and impacts

The damages and impacts from harvesting are monitored in each harvest season. According to the monitoring reports for the last six annual production units, harvesting operations impacted around 12 percent of the total forest management area.

Medium-sized and large mammals that inhabit the region are being monitored under a 2015 agreement with the University of Rondônia. Monitoring reports indicate the regular presence of these mammals in harvested areas following a period of pause in operations.

Nest trees, endemic species and species prohibited for exploration are monitored on an annual basis. Reports indicate full compliance with measures to avoid damage to these resources as well as the permanent protected areas.



## 2.9. Challenges and threats

The primary challenge facing tropical forest management today is the absence of a robust market for tropical wood products. This issue is exacerbated by the growing misconception in the country that logging in natural tropical forest is a significant driver of deforestation (e.g. Lentini *et al.*, 2022). Regrettably, as demand dwindles, so does the capacity to safeguard these vital forests and recognize their intrinsic value.

In the last decade, the number of sawmills operating in the municipality has decreased from 60–70 to barely 30. This reduction was due to the growing scarcity of wood in Cujubim as well as the enormous pressure to comply with harvesting regulations. Many forest producers sold their management area after harvesting, arguing that they could not wait the mandatory 30-year cutting cycle. These areas were ultimately deforested. During this period, a commodity boom, such as for soybean, encouraged the transformation of forest land into agriculture.

Operational planning is also being affected by changing rainfall patterns, which are shifting towards less precipitation and greater unpredictability.

## 2.10. Opportunities

There are opportunities for MANOA linked to an increased demand for quality wood of legal origin to supply the domestic market, with policies and measures that effectively promote SFM and forest certification in the Amazon.

Encouraging the improvement of forest management, especially in terms of making it more sustainable and more economically attractive compared to other land uses, includes not only improving management practices currently being employed but developing markets for a broader

*A jaguar (Panthera onca) photographed by a camera trap in a recently harvested unit at MANOA*



*A smartphone mapping application showing the locations of all commercial trees in a harvesting area*

range of usable species, primarily for what we now call lesser-known species. This matter should also include initiatives aimed at the multiple uses of the forest and the use of residues and other by-products generated by the industry, which are rarely used today (Valdiones *et al.*, 2022).

Forest management for carbon is recent, and the rules of the game and the market itself are not yet consolidated. MANOA does not consider carbon as the main income source, but rather as a complement.

### 2.11. Partnerships

MANOA has developed a solid reputation as a serious and committed company. There is no encroachment onto the company land despite it being in an area with expanding agroextractivist settlements, indicating that people value the benefits the company generates. The business policy was and is to have partnerships with the community.

The company also has good relations with environmental agencies at the municipal, state and federal levels, for example the Secretary of State for Environmental Development, Chico Mendes Institute for Biodiversity Conservation (Instituto Chico Mendes de Conservação da Biodiversidade) and the Brazilian Institute of Environment and Renewable Natural Resources (Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis), as well as with clients, researchers and educators.

### 2.12. Innovation, recognition and outreach

MANOA has introduced several innovations at both the managerial and technical levels – as described in Sections 2.5 and 2.6. The company's long-term relationships with various key actors, as well as its educational, transfer and training activities, enable MANOA to share its experiences and good practices, thus disseminating the benefits of SFM.



In 2014, MANOA established a forestry education centre in line with the company policy of sharing experience and promoting technical exchange. Between 2008 and 2017, MANOA promoted 37 activities for different sectors, directly benefiting 362 people, including students and professionals. Today, 100 to 200 people visit this centre every year, including clients, government officials, auditors and researchers, as well as representatives of universities and municipal schools.

MANOA has developed its own computer system to control inventory, logging operations and sales, thus reducing waste and increasing efficiency of operations.

The company has been acknowledged by certification entities (FSC, Certified Carbon Standard and Programme for the Endorsement of Forest Certification) for its responsible forest management practices.

## 3. KEY LESSONS LEARNED

- Good relations with communities, authorities at different levels, clients, academia, educators and organized civil society in general contribute to making visible the benefits and sustainability of SFM.

- The responsible management of the forest to sell logs of commercial species at the local level can be profitable in the Brazilian Amazon, generating jobs and contributing to well-being.
- A business vision and policies that prioritize forest sustainability, management quality and social commitment must first be appropriated by the employees themselves, who recognize and embrace the company's heritage and the values and standards that guide it.

#### 4. FUTURE OUTLOOK

In the current context, the future of SFM in the Brazilian Amazon is uncertain. First, there is common misconception about what forest management is, not only among policymakers but also among government officials and civil society actors. Second, government policies tend to encourage forest conversion to agriculture and livestock (agribusiness). "Today a hectare of forest is worth Brazilian real (BRL) 1 000 to 3 000, while a deforested area is worth BRL 40 000 to 50 000", said Murilo Granemann, Sales Director at Triângulo Group. Furthermore, illegal logging and trade in illegal timber are big obstacles to making SFM viable in the Amazon.

The demand for legal timber – coming from forests that are managed in compliance with the legislation – will continue to increase in the region, although changes are expected in the composition of the main commercial species. On the other hand, the carbon business is not yet consolidated, with uncertainties about methodologies, conditions and modalities for transactions.

MANOA has a keen eye towards the future, strategizing for optimal methods that will contribute to safeguarding and enhancing the value of the forest in the long term. With its vision, business policy and transparent operations, MANOA wants to demonstrate that managing for timber and eventually carbon capture can make SFM viable, but the evidence must be brought to public decision makers, investors and producers.

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