Report on Methodology Compliance and Monitoring Report (RMCMR)

Legado das Águas/SP
September 2023

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1.1. INTRODUCITON

The protection of native vegetation, its associated ecosystem, as well as the conservation of biodiversity and scenic beauty are modalities of environmental services of great importance for society. From these activities, the services provided by nature, called Ecosystem Services, can be maintained, and developed, bringing great benefits to the well-being of human beings.

A well conserved area contributes to the mitigation of climate change, through the generation of these Ecosystem Services, such as the sequestration and maintenance of carbon stocks, provision of water resources, among others.

In this context, this report aims to apply the PSA Carbonflor Methodology to "Legado das Águas", a private property located in the Atlantic Forest, a process through which it will be possible to verify the importance of Environmental Services provided, contributing to the global objective of mitigating climate change through the support to the provision of Ecosystem Services, such as those presented in this report.

The valuation and remuneration of the provided Environmental Services is made through the constitution and commercialization of tradeable credits called Carbon Plus (C+).

1.1.1. REFERENCES

For the elaboration of this Report on Methodology Compliance and Monitoring Report, the PSA Carbonflor Methodology (version 2.1), prepared by ECCON Soluções Ambientais, was used as a reference.

1.2. PSA CARBONFLOR GUIDELINES

1.2.1. REGISTRATION OF THE PROJECT AREA – ECCON DATA

The area that encompasses the Project Area of this Report on Methodology Compliance and Monitoring Report is called **Legado das Águas**, which is located in the Vale do Ribeira, consisting of the largest Atlantic Forest reserve in Brazil, with about 31 thousand hectares of contiguous forest. The Legado das Águas is recognized as an Outpost of the "Reserva da Biosfera da Mata Atlântica", promoting forest protection, scientific research, ecotourism, production of native seedlings, as well as social action and environmental education with support for public management, promotion of the local economy and socioeconomic development.

In its eleven years of existence, acting on the areas of scientific research, plant production of native species and public use (especially ecotourism), the Legado das Águas has shown that it is possible to generate resources from "nature production", in other words, the standing forest generates economic gains to protect its ecosystems and biodiversity. Also, in the social area, the reserve integrates the UN Sustainable Development Goals (SDGs) in 100% of its operations, publishing a report that measures the effectiveness of the business model, combining priorities for action, indicators, commitments, and business goals with the SDGs.

In relation to biodiversity, it is noteworthy that 75% of the area is composed of primary forest, a composition that has become a cradle and refuge for rare and endangered species. The diversity of fauna found in Legado das Águas represents 13.5% of all

threatened animal species in the Atlantic Forest. Regarding flora, the reserve maintains an important Biodiversity Center with the nursery of native species of the Atlantic Forest. It is an unprecedented initiative in the country, with the production and genetic bank of rare and endangered plants of the native flora, which allocates them for reforestation and landscape projects in urban centers[1].

Overall, the Legado is considered a global reference of management and innovation in sustainability with the generation of shared value, and its main objective is to transform natural and cultural assets into sustainable businesses. The PSA Carbonflor is an instrument developed by ECCON and which, applied to Legado das Águas, contributes to the generation of revenues from the standing forest, strengthening the conservation of the environment allied to sustainable economic development.

The Project Area is registered with ECCON Data[2], under the code SP-01780[3]. Thus, in a summarized form, it is possible to verify general information of the area, location, and references, for future environmental businesses involving the PSA Carbonflor.

1.3. PROPONENT

The proponent of this Report on Methodology Compliance and Monitoring Report under the PSA Carbonflor Methodology is ECCON Soluções Ambientais. ECCON was created in 2014, with operations in the areas of licensing, environmental consultancy, carbon and georeferencing information. It is an international reference and its work with the carbon market is relevant in the Brazilian scenario, already having experience with the elaboration of REDD+ Projects using international methodologies.

1.4. INVOLVED ENTITIES

The Project Proponent is ECCON Soluções Ambientais, with the support of Reservas Votorantim, owner of the Project Area, Legado das Águas, which is the largest private Atlantic Forest reserve in Brazil.

The organizations involved in this Report are, for each modality:

  i. financing: Reservas Votorantim, which is an organization with the objective of generating responsible business in protected areas, ensuring the maintenance of the area itself and fostering new local production chains, to generate shared value for the company and society
  ii. elaboration of technical parts: ECCON Soluções Ambientais, which is the company responsible for providing environmental consulting, with expertise in the elaboration of carbon projects;
  iii. product offering: ECCON Soluções Ambientais, through the ECCON Data platform, where the Project Area is registered.

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[1] Legado das Águas 2021 Report. Available at https://legadodasaguas.com.br/legado/wp-content/uploads/2022/04/af_relatoriolda2021web.pdf.
[2] Available at: https://ecconsa.com.br/eccondata/#/landing
[3] Available at: https://ecconsa.com.br/eccondata/#/landing/area-details/1780

1.5. STRATEGIC AUDIENCE

The strategic audience of the Project is the community surrounding the Project Area, as well as the scientific community, which will benefit from the scientific research, related to monitoring of fauna and flora on site.

Visitors to the Project Area will also be positively affected, who, in addition to acquiring knowledge of the conservation of vegetation and biodiversity in the area, will also be able to witness an area pioneering in the participation in Payment for Environmental Services, in a certified manner.

Finally, and most importantly, society overall benefits from an area of 31,000 ha of conserved Atlantic Forest, which serves as a shelter and nursery for endangered species, maintaining water quality, and its effect on climate change mitigation and local microclimate regulation.

1.6. PROJECT CONTRIBUTIONS TO SUSTAINABLE DEVELOPMENT

All the work carried out over the last eleven years in the Legado das Águas has as its basic premise to follow the Sustainable Development Goals (SDGs).

In 2019, the mapping of the possible synergies between the goals and indicators of the SDGs monitored by the IBGE was carried out, in view of the processes of each area of the Legado.

In 2020, indicators were structured that reflected the results of the areas and, at the same time, contributed to the SDGs. In 2021, these indicators began to be monitored, further reinforcing the purpose of Reservas Votorantim's activities since its inception. It is important to emphasize that, still in 2021, Reservas Votorantim, manager of the Legado das Águas, joined the Global Compact, an initiative with which it has made a continuous commitment to its principles, represented in the 2022 SDG progress report[4].

We present below the contributions of the Project regarding the SDGs, with the actions that will be carried out to comply with the needs of the Socio-Environmental Agenda

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[4] Information obtained from the SDG Progress Report in 2022.

Table 1. Project Contributions to Sustainable Development

SDG[5]	Description	Project Contributions	Expected/obtained results
1 – No Poverty	*1.2. By 2030, reduce by at least half the proportion of men, women and children of all ages living in poverty in all its dimensions, according to national definitions*	*Contracting of services and / or materials from suppliers of the Vale do Ribeira.* *Hiring people from the region of the Legado.*	*Proportion of local contracting of services and materials: Average of local hires 18%.* *Monthly amount of contracting service or local material: Monthly average of R$ 140,000 invested in contracting service or local material.* *Proportion of 100% of local guides in the Legado.*
2 - End hunger	*2.5 By 2020, maintain the genetic diversity of seeds, cultivated plants, farmed and domesticated animals and their respective wild species, including through diversified and well-managed seed and plant banks at national, regional and international levels, and ensure access to and fair and equitable sharing of benefits arising from the utilization of genetic resources and associated traditional knowledge, as internationally agreed*	*Production of native seedlings for landscaping*	*98,429 plants produced*
3 – Good Health and Well-being	*3.8 Achieve universal health coverage, including protection from financial risk, access to quality essential health services and access to safe, effective, quality and affordable essential medicines and vaccines for all*	*Implementation of the Single Health Program (PSU).*	*Contribution to public health in the Vale do Ribeira, in partnership with health researchers. The objective and expected results are the creation of a network of partners with technical capacity to share knowledge on topics related to the concept of single health.* *The above concept considers that human and animal health are*

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[5] The SDG classification is available at: https://sdgs.un.org/goals.

SDG[5]	Description	Project Contributions	Expected/obtained results
			interdependent and linked to the health of ecosystems.
4 – Quality Education	*4.4 By 2030, substantially increase the number of young people and adults who have relevant skills, including technical and professional skills, for employment, decent work and entrepreneurship.* *4.7 By 2030, ensure that all students acquire knowledge and skills necessary to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and the contribution of culture to sustainable development*	*The Project has a catalog[6] of environmental education and SDG activities, to be applied in schools and educational institutions.* *In addition, the Legado also has the Programa Guardiões da Mata Atlântica [Guardians of the Atlantic Forest Program], which aims to promote initiatives that address the environmental theme and biodiversity conservation.*	*Ensure the knowledge of students about the SDGs, in a practical way, with works in the Project Area, which helps in the learning process.* *Training of the Ecotourism team, with a workload of 49 hours.* *Training of the Monitoring team, with a workload of 38 hours.*
5 - Gender equality	*5.1 End all forms of discrimination against all women and giLRs everywhere*	*Promote internal actions that contribute to non-discrimination against women.* *Hired female labor.* *Women in leadership positions.*	*69.2% of female labor hired by Reservas Votorantim.* *58.3% of female labor hired by Legado das Águas.* *67% of women in leadership positions in the Branch and 75% of women in leadership positions in the Headquarters.*
6 – Clean Water and Sanitation	*6.1 By 2030, achieve universal and equitable access to safe drinking water for all.*	*The Project, by encouraging the conservation of forests, contributes to the protection of water bodies such as rivers, lakes or aquifers, ensuring the*	*Ensure the protection of water bodies from the conservation of forests.* *Monitoring of 2,214 km of water area.*

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[6] Available at: https://legadodasaguas.com.br/legado/wp-content/uploads/2021/02/af_ebookedambientalods-diagramado.pdf .

SDG[5]	Description	Project Contributions	Expected/obtained results
	6.3 By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing the release of chemicals and hazardous materials, halving the proportion of untreated wastewater, and substantially increasing recycling and safe reuse globally. *6.6 – By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes.*	*maintenance of the quality and availability of the resource.*	*100% sanitation in the operation.*
8 – Decent work and economic growth	*8.7 Take immediate and effective action to eradicate forced labor, end modern slavery and trafficking of persons, and ensure the prohibition and elimination of the worst forms of child labor, including the recruitment and use of child soldiers, and by 2025 end child labor in all its forms* *8.9 By 2030, develop and implement policies to promote sustainable tourism, which generates jobs and promotes local culture and products*	*The Project has several options for Ecotourism, which generate an interest in conservation, fosters the local economy and supports the maintenance of the Project Area.*	*Awareness of the impact of sustainable tourism for society and generate leisure with socio-environmental responsibility.* *151% growth in revenue compared to 2021 in Q1; a drop of 72% and 62% in Q2 and Q3, respectively; and a 58% increase in Q4 2022.* *Assessment of hiring of workers in relation to child labor.*
9 - Industry, innovation and infrastructure	*9.5 Strengthen scientific research, improve the technological capacities of industrial sectors in all countries, particularly developing countries, including, by 2030, encouraging innovation and substantially increasing the number of research and development workers per million people and public and private spending on research and development*	*Development of internal research programs and projects and with partners.*	*43 programs and/or projects developed, with an investment of R$ 129.6 thousand and 53 participants.*

SDG[5]	Description	Project Contributions	Expected/obtained results
	9.b Support national technological development, research and innovation in developing countries, including by ensuring a policy environment conducive to, among other things, industrial diversification and adding value to commodities		
10 – Reduced Inequalities	*10.3 Ensure equal opportunities and reduce inequalities in outcomes, including through the elimination of discriminatory laws, policies and practices and the promotion of appropriate legislation, policies and actions in this regard*	*Development of Code of Conduct and Inclusion Policy.*	*Conducting training in relation to policies.*
11 – Sustainable Cities and Communities	*11.4 Strengthen efforts to protect and safeguard the world's cultural and natural heritage* *11.a Support positive economic, social and environmental relations between urban, peri-urban and rural areas, strengthening national and regional development planning*	*Development of programs and projects integrated to the development of the territory and the conservation of the Atlantic Forest.*	*9 programs and/or projects developed.*
12 – Responsible consumption and production	*12.2 By 2030, achieve sustainable management and efficient use of natural resources.* *12.5 By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse* *12.6 Encourage companies, especially large and transnational companies, to adopt sustainable practices and integrate sustainability information into their reporting cycle*	*The Project seeks to manage the Project Area in a sustainable and efficient way.* *Management of domestic waste in the internal and external community.*	*Biodiversity conservation and associated ecosystem services.* *Training of the team 6 times in the year of 2022, for topics related to Communication and Marketing. Realization of 30 disclosures related to conservation in the regional or national press. 171 posts on the Legado's social networks.* *Legado reports published.*

SDG[5]	Description	Project Contributions	Expected/obtained results
	12.8 By 2030, ensure that people, everywhere, have relevant information and awareness for sustainable development and lifestyles in harmony with nature		*Certification in relation to waste for 100% of the activities developed in the Legado.*
13 – Climate action	*13.3 Improve education, increase awareness and human and institutional capacity on mitigation, adaptation, impact reduction and early warning of climate change;* *13.b Promote mechanisms for capacity building for climate change-related planning and effective management in the least developed countries, including with a focus on women, youth, local and marginalized communities*	*The Project manages the surrounding communities with a focus on Environmental Education, local economy and community resilience.*	*Resilience benefits for the local community.*
15 – Life on land	*15.1 By 2020, ensure the conservation, restoration and sustainable use of inland terrestrial and freshwater ecosystems and their services, in particular forests, wetlands, mountains and arid lands, in accordance with obligations under international agreements;* *15.2 By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests, and substantially increase afforestation and reforestation globally;* *15.b Mobilize significant resources from all sources and at all levels to finance sustainable forest management and provide adequate incentives to developing countries to promote*	*The Project promotes, according to all the programs and activities mentioned, the sustainable management of the Project Area, reinforces the need for conservation of ecosystems, and promotes the necessary resources to finance and give incentives to scientific research related to biodiversity.*	*Promotion of awareness of the need for conservation of forest ecosystems, creation of an environment suitable for scientific development and protection of fauna and flora.* *Reforestation of 146.1 hectares.* *Monitoring of 233,141 km of land area, as well as drone overflight. Inspection of the area to identify risks.*

SDG[5]	Description	Project Contributions	Expected/obtained results
	sustainable forest management, including for conservation and reforestation		
17 – Partnerships for the goals	*17.1 Strengthen domestic resource mobilization, including through international support to developing countries, to improve national capacity to collect taxes and other revenues* *17.16 Strengthen the global partnership for sustainable development, complemented by multi-sectoral partnerships that mobilize and share knowledge, expertise, technology and financial resources, to support the achievement of the sustainable development goals in all countries, particularly in developing countries* *17.17 Encourage and promote effective public, public-private and civil society partnerships, building on the experience of the resource mobilization strategies of these partnerships*	*Registration of Projects in Public Notices.* *Development of partnership in the Projeto Pomar Urbano e Parque Linear [Urban Orchard Project and Linear Park].* *Direction of Taxes to the municipality where the activities are carried out.*	*2 Projects approved by 2022.* *3 Partnerships with Agencies.* *Development of Partnerships and Networks: Mel do Vale Project, Valorization of Education, Economic Recovery Program, Open Doors, Legado dos Pássaros, Neo Running, Natureza de Criança, Cine Autorama, Buzum, Sport and Citizenship ECA, Viver Melhor.*

1.7. DEFINITION OF ELIGIBILITY CRITERIA FOR THE METHODOLOGY

This report considered the eligibility criteria provided for in the Methodology and presents in this item the selected criteria, with respective selected documents and justifications. Documents related to the eligibility criteria will be presented in item 1.10.2 *Compliance With Eligibility Criteria* of the Project Area.

Table 2. Selected documents for the Project Area.

Eligibility Criteria	
Document Criteria	Documents of the holder (extract of the CNPJ and copy of the social contract).
	Rural Environmental Registry (CAR) of the property.
	Property registration of the area.
	Updated CCIR.
	Certificate of civil proceedings.
	Certificate of criminal proceedings.
	Certificate of municipal and state taxes.
	Certificate of Debts of the Federal Revenue Service.
	Certificate of Labor Processes.
	Negative certificate of embargo from IBAMA.
Location Criteria	No overlap with cavities and caves, geological sites, archaeological sites, indigenous territories, quilombola territories or Conservation Units.
	Accounting of PPA and LR, according to Law No. 14,119/2021.
	History of native vegetation cover in the last 10 years.

The following sub-items substantiate the choice of each of the eligibility criteria selected by the proponent.

1.7.1. DOCUMENT REGULARITY

The analysis of document regularity considers:

i.   **Presentation of property registration**: The property registration or title of possession is a document of ownership that individualizes the rural property demonstrating its location and detailed description. Other documents of possession such as contracts of sale or deeds do not confer title to the property.

The registration contains the complete history of a property, including its previous records, dismemberments, unifications, inventories and disposals, encumbrances, mortgages, usufructs, etc. There may also be information about the Rural Property Registration Certificate ("CCIR"), the Rural Environmental Registry ("CAR") and the georeferencing of the property. It must have been issued in the last ninety (90) days.

ii.   **Presentation of property registration in** the CAR: created by Law No. 12,651/2012 and regulated by MMA Normative Instruction No. 2/2014, the CAR is a self-declaratory and mandatory registration to rural properties, comprising environmental information of the properties, through the delimitation of the area of remnants of native vegetation, Legal Reserve (LR) area, Permanent Preservation Areas (PPA), areas of consolidated use, areas of restricted use, areas of administrative easement and areas intended for environmental compensation. Law No. 14,119/2021 also conditions the registration in the CAR as a criterion for PSA projects. Considering that CAR

is the instrument that will provide information about the use of the land on the property, such as the extensions, in hectares, of the remaining areas of native vegetation, PPAs, LRs, productive areas, degraded areas, etc., it is understood that the presentation of the document is fundamental for the confirmation of the existence of areas suitable for the implementation of the project and generation of carbon credits.

iii. **Presentation of Certificates:** The certificates are requested on behalf of the owner of the property to identify if there are judicial or administrative proceedings that may impact the project (criminal, civil or tax actions) or affect the image of those who develop activities in the area (labor actions). Also, through the Ibama Negative Embargo Certificate, it is possible to assess whether the property contains any embargoed area, which needs to be regularized before the environmental agency.

Thus, carrying out this documentary analysis is fundamental to ensure that the project is well planned and executed in a responsible and sustainable way, avoiding the following risks:

- Property-related: landowner not being a legitimate owner with powers to negotiate in the area to be prospected, existence of liens and easements, compatibility of documentary data;
- Judicial: extent of debts, nature and status of legal proceedings;
- Related to the environment: overlap with protected areas, existence of liabilities or irregularities that make the execution of the project unfeasible or impaired.

The documents related to document regularity criteria will be presented in item 1.10.2 *Compliance With Eligibility Criteria* of the Project Area.

1.7.2. OVERLAP WITH PROTECTED AREAS

For the Legado das Águas Project Area, according to the Methodology, geospatial analysis was carried out, so that areas that contain overlap with the following were excluded:

i. Cavities and caves;
ii. Geological sites;
iii. Archaeological sites;
iv. Indigenous Lands;
v. Quilombola Territories;
vi. Full Protection Conservation Units .

Demonstrations related to overlap with protected areas criteria will be presented in item 1.10.2 *Compliance With Eligibility Criteria* of the Project Area.

1.7.3. APPLICATION IN LEGAL RESERVE AND PERMANENT PRESERVATION AREAS

Legal reserve (LR) areas and permanent preservation areas (PPA) may be included and accounted for in the Project Area, as defined by law (article 3, items II and III, of Law No. 12,651/2012):

> *"II - Permanent Preservation Area (PPA): protected area, covered or not by native vegetation, with the environmental function of preserving water resources, landscape, geological stability and biodiversity, facilitating the gene flow of fauna and flora, protecting the soil and ensuring the well-being of human populations;*
>
> *III - Legal Reserve (LR): area located within a property or rural possession, delimited in accordance with article 12, with the function of ensuring the economic use in a sustainable way of the natural resources of the rural property, assisting the conservation and rehabilitation of ecological processes and promoting the conservation of biodiversity, as well as the shelter and protection of wild fauna and native flora".*

It is important to note, in this sense, that Law No. 14,119/2021 confers, in its article 9, sole paragraph, the eligibility of these areas:

> *"Art. 9 In relation to private properties, the following are eligible for the provision of environmental services:*
>
> *I - those located in rural areas registered in the CAR, provided for in Law No. 12,651, of May 25, 2012, exempting this requirement for those referred to in item IV of the caput of article 8 of this Law;*
>
> *II - those located in urban areas that are in accordance with the city's master plan, referred to in § 1 of article 182 of the Federal Constitution, and with the legislation resulting therefrom;*
>
> *III - the Private Reserves of Natural Heritage (RPPNs) and the areas of buffer zones and ecological corridors covered by native vegetation, under the terms of Law No. 9,985, of July 18, 2000.*
>
> *Single paragraph. The Areas of Permanent Preservation, Legal Reserve and others under administrative limitation under the terms of environmental legislation shall be eligible for payment for environmental services with the use of public resources, according to regulation, with preference for those located in hydrographic basins considered critical for the public water supply, as defined by the competent body, or in priority areas for the conservation of biological diversity in the process of desertification or advanced fragmentation."*

Demonstrations related to the criteria for applying the Methodology in LR and PPA will be presented in item 1.10.2 *Compliance With Eligibility Criteria* of the Project Area.

1.7.4. HISTORY OF LAND USE AND LAND COVER IN THE LAST 10 YEARS

Since the Methodology deals with the Ecosystem Services generated by the ecosystem provided by native vegetation, including climate regulation, climate change mitigation, and habitat maintenance, for the properties to act effectively as providers of Environmental Services, the owner must act as a conservation agent for a period of at least 10 years prior to the beginning of the Valuation Period.

Thus, it should be verified whether the Project Area has eligible native vegetation cover, which may be forest, savanna or other formations, in the 10-year period preceding the Valuation Period Start Date, thus characterizing an area with an advanced degree of vegetation development.

As will be described below, the start date of the Project Area Valuation Period in question is December 8, 2017.

Demonstrations related to the criteria for evaluation of the history of land use and land cover in the 10 years prior to Valuation Period will be presented in item 1.10.2 *Compliance With Eligibility Criteria* of the Project Area.

1.8.   PROJECT PERIODS

According to methodological guidelines, the present RMCMR will adopt the Valuation Period of 100 years.

The Adhesion corresponds to the date of the signature of the letter of intent with the commitment to the conservation of native vegetation, In the case of Legado das Águas, it is considered that the commitment began in December 2015, when Legado das Águas signed a commitment with government agencies[7], as presented in Annex I. In addition, in the case of the Legado das Águas, after Adhesion the signing of a contractual instrument took place, between Reservas Votorantim and ECCON Soluções Ambientais, who is the proponent responsible for the preparation of the technical parts, dated August 12, 2022.

The Valuation Period, in this case, will be retroactive to the signing of the contract and the beginning of the application of the Methodology, in the period prior to 5% of the duration of the Project, contemplating 5 years of retroactivity.

For this Project Area, it is considered as a reference to determine the beginning of the Retroactive Valuation Period, as justified above, the date **of December 8, 2015**, when the "*Protocol of Intentions signed between the Government of the State of São Paulo, through the Secretariat of State for the Environment; The Foundation for Conservation and Forest Production of the State of São Paulo; Votorantim Industrial S/A; and Reservas Votorantim Ltda., to propose actions aimed at the conservation of biodiversity and the adequacy of the way of managing natural resources in the area of the "Reservas Votorantim– Legado das Águas" located in the municipalities of Juquiá, Miracatu, Tapiraí, and others.* This protocol, valid for 5 years, was renewed on December 8, 2020 (Annex I).

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[7] The letter of intent is the signed commitment of conservation, either the means of a document obtained with government agencies or obtained through the registration in ECCON Data.

Thus, meeting the standards determined by the proponent, the beginning of the Valuation Period was established on **December 8, 2017**. Therefore, the C+ of this Project Area prior to the signing of the Reservas Votorantim and ECCON contract will be counted retroactively.

The issuance of C+ can occur whenever the full period of 12 months has elapsed, and the period to which the C+ refers must be recorded.

The table below presents the periods that will be considered for the verification of the EnS provided by the Legado das Águas in this first report and first EcS monitoring event.

Table 3. EnS verification period for the RMCMR.

Area name	EnS Verification Period	Year
Legado das Águas	Dec 8th, 2017 to Dec 7th, 2018	1
	Dec 8th, 2018 to Dec 7th, 2019	2
	Dec 8th, 2019 to Dec 7th, 2020	3
	Dec 8th, 2020 to Dec 7th, 2021	4
	Dec 8th, 2021 to Dec 7th, 2022	5
	Dec 8th, 2022 to May 7th, 2023*	6

*Partial period considered in the RMCMR 2023.

The table below presents the Project Periods determined for the Legado das Águas Project Area.

Table 4. Project Periods.

Dates	Valuation Period	Project Period	Monitoring Period*
Start Date	Dec 8th, 2017	Aug 12th, 2022	May 2023
End Date	Dec 7th, 2117	Dec 7th, 2117	Dec 7th, 2117

* The periodicity of the monitoring will be defined in the item 1.13 Monitoring Plan

1.9. PROJECT BOUNDARIES

This item describes the project boundaries according to the Methodology for (i) Project Area, (ii) Native Vegetation Area and (iii) Area of Influence.

1.9.1. PROJECT AREA

As defined in the Methodology, Project Area is the composition of conserved areas that will be considered for the calculation of C+ and measurement of EcS present in the ecosystem of Legado das Águas.

The Project Area is formally the supplier of essential EcS and EnS to health and economic activities, which benefits the whole society and transforms the conservation of the environment into business.

In this report, we refer to Legado das Águas, a private reserve of Atlantic Forest that occupies about 31 thousand hectares in the municipalities of Juquiá, Juquitiba, Miracatu, Piedade and Tapiraí, in Vale do Ribeira, in the interior of the State of São Paulo. As described in the following items regarding the characterization of the Project Area (see

item 1.10), the reserve combines forest protection with the development of scientific research and activities such as production of native plants and ecotourism.

Legado das Águas was created in the context of the signing of a Protocol of Intentions between the company Reservas Votorantim and the Government of the State of São Paulo, signed in 2012 and renewed in 2015 and 2020 (Annex I). This document defines a series of voluntary initiatives on different fronts, establishing the guidelines for a private nature reserve aimed at sustainable development. With the Protocol, Reservas Votorantim makes public the socio-environmental commitment of Legado das Águas, of reconciling the conservation of the Atlantic Forest with economic activities, helping to promote development and improve the quality of life in the territory.

The Project Area to be considered in this RMCMR considers the eligible portions of the property of Legado das Águas, as well as the regions considered applicable by the owner and provider of Environmental Services, Reservas Votorantim. Areas occupied by villages, overlaps with SIGEF, areas of extraction monitoring, deforestation and indigenous lands were removed to compose the 23,988.9 hectares of the Project area represented in the figure below.

Figure 1. Project Area of Legado das Águas.
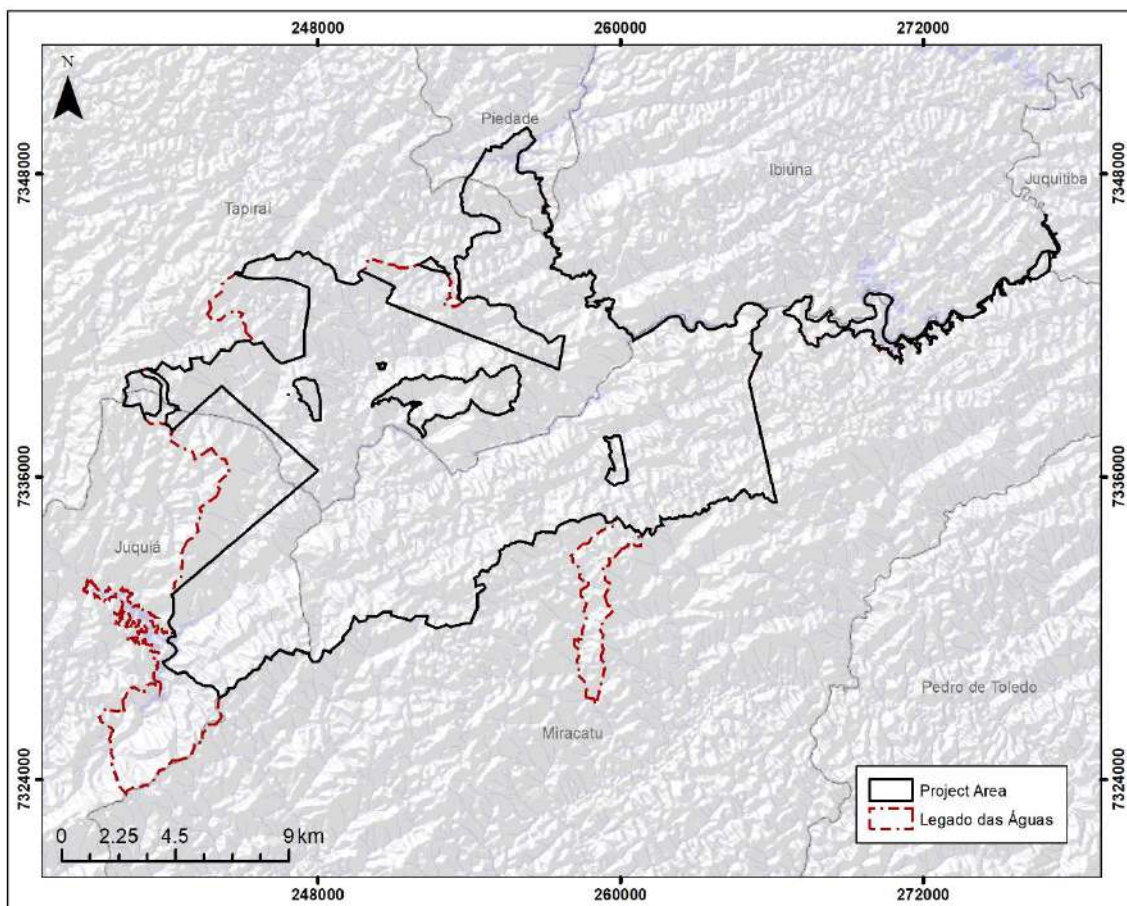
1.9.2. NATIVE VEGETATION AREA

For the application of calculations regarding the Ecosystem Indicator "Stored Carbon" (see item 2.2) and the emission of C+, only the Native Vegetation Area of the Project Area should be considered, according to the technical and documentary details described in the Methodology and in the applicable items of this report. In this case, the Native Vegetation Area corresponds to 21,745.4 ha (twenty-one thousand, seven hundred and forty-five point four hectares), as shown below.

To define the spatial boundaries of the Native Vegetation Area, the following were considered: mappings from the MapBiomas project, IBGE mapping, as well as the polygons, property registrations and CARs provided by Reservas Votorantim, which constitute the Legado das Águas area. From the mentioned data all the non-eligible areas were subtracted, such as administrative, tourism and energy structures, local roads, right of way, areas of established communities and indigenous land, water bodies, in addition to currently deforested areas without preserved native vegetation. The characterization of discounted areas will be presented throughout item 1.10 .

Once the ineligible areas were removed, the dimensions of the Native Vegetation Area were obtained for the application of the pertinent calculations determined by the Methodology. The area measuring 21,745.4 hectares is shown in the figure below.

Figure 2. Native Vegetation Area of the project.
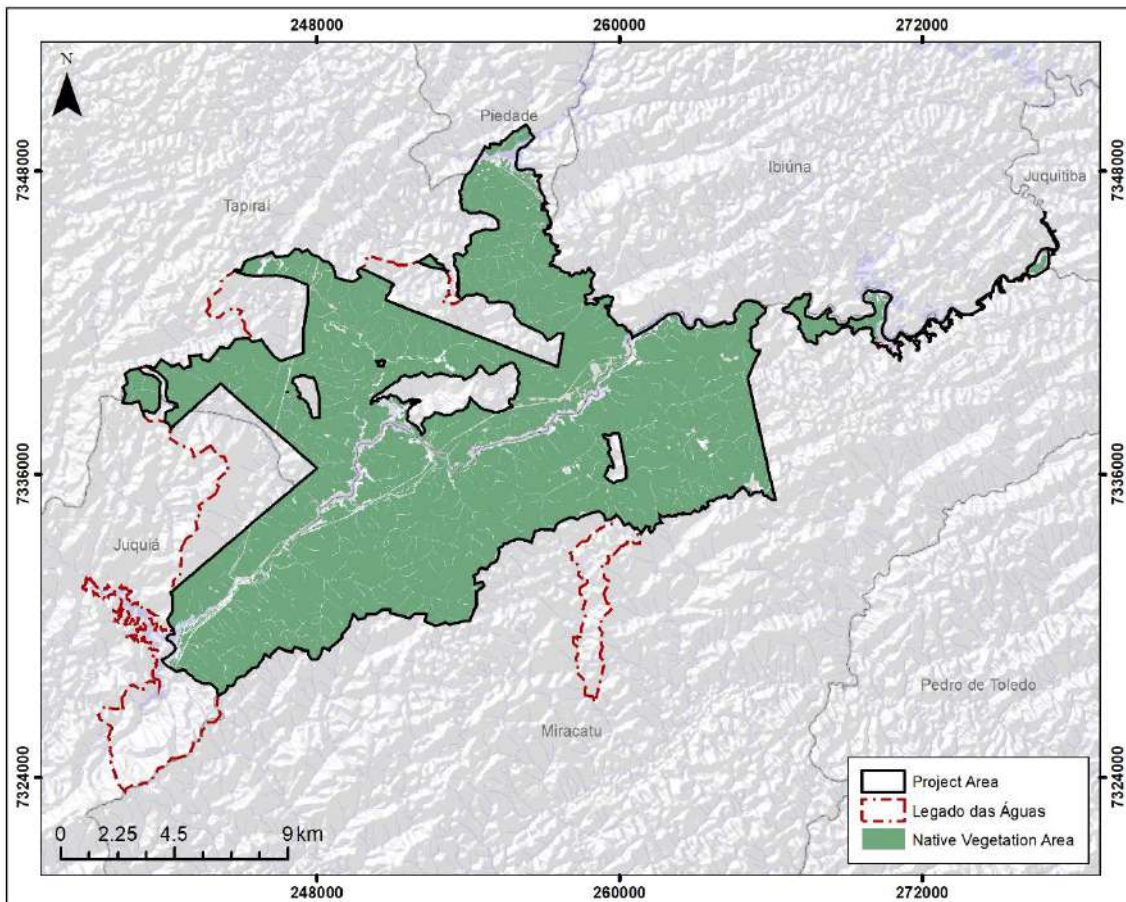
The following Figure shows the stratification of the Native Vegetation Area with its two identified phytophysiognomies, which will be considered for the emission of C+, namely: Dense Ombrophilous Montane Forest and Dense Ombrophilous Submontane Forest, as surveyed and described in item 1.10.4.

Figure 3. Phytophysiognomies in the Native Vegetation Area.
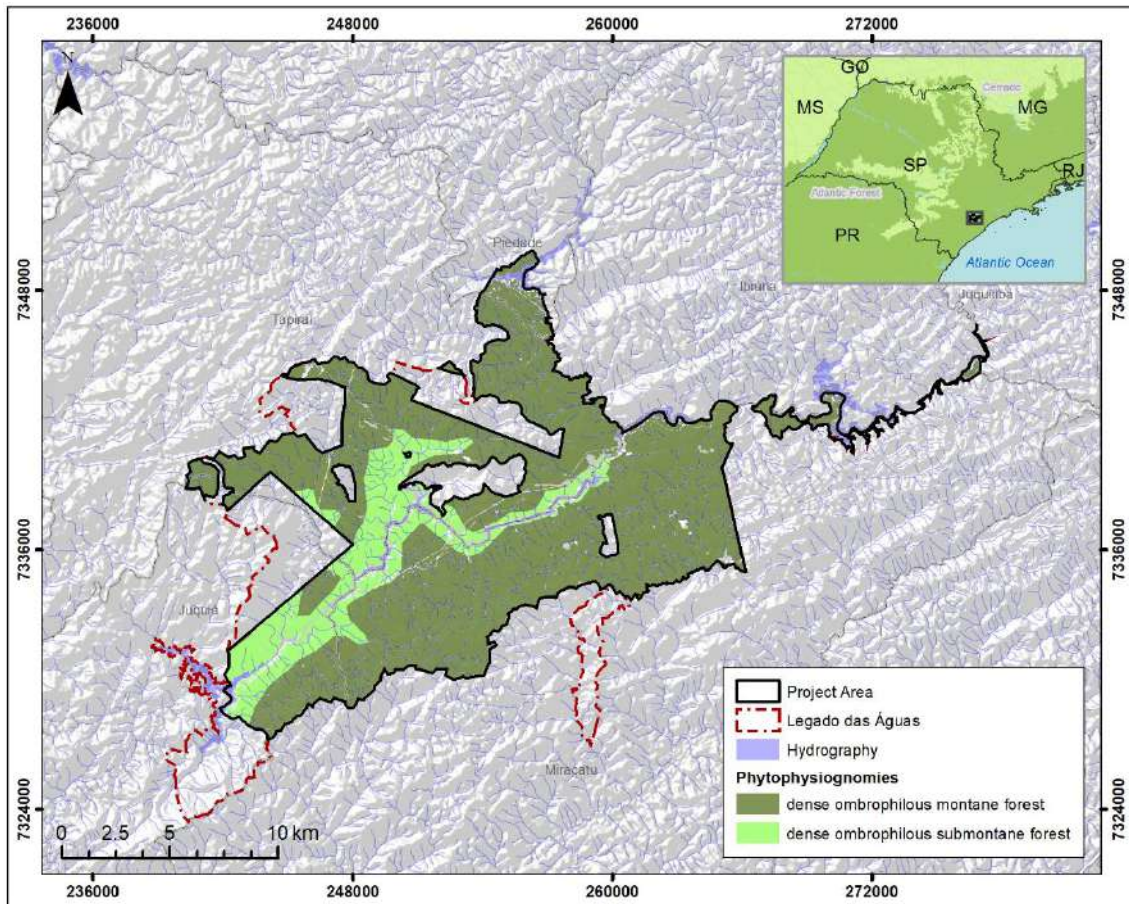
Source: IBGE/ BDIA/ CETESB.

The following table indicates the area corresponding to each phytophysiognomy identified in the project's Native Vegetation Area, so that the carbon stock parameters can be considered in the calculations presented in subsequent items and related indicators.

Table 5. Eligible area by phytophysiognomy in the Project Area.

Phytophysiognomy	Eligible area (ha)
Dense Ombrophilous Montane Forest	18,098.50
Dense Ombrophilous Submontane Forest	3,646.95

1.9.3. AREA OF INFLUENCE

The delimitation of the Area of Influence is extremely important so that there is a region that can be compared with the Project Area, and which allows the measurement of Ecosystem Indicators.

Thus, to determine it, a buffer of 2 kilometers was created from the boundary of the properties that make up the Project Area, to obtain a spatial area of at least 23,988 ha (Project Area), as specified by the Methodology.

However, it is understood that despite reaching the minimum required area, this buffer was not very representative from the PES point of view. Thus, for the Area of Influence to achieve the objectives and assist in the identification and measurement of Ecosystem Indicators, a buffer of 3 kilometers was considered, as observed in Figure 4 as "Region of Influence".

Figure 4. Location of the project's Area of Influence.
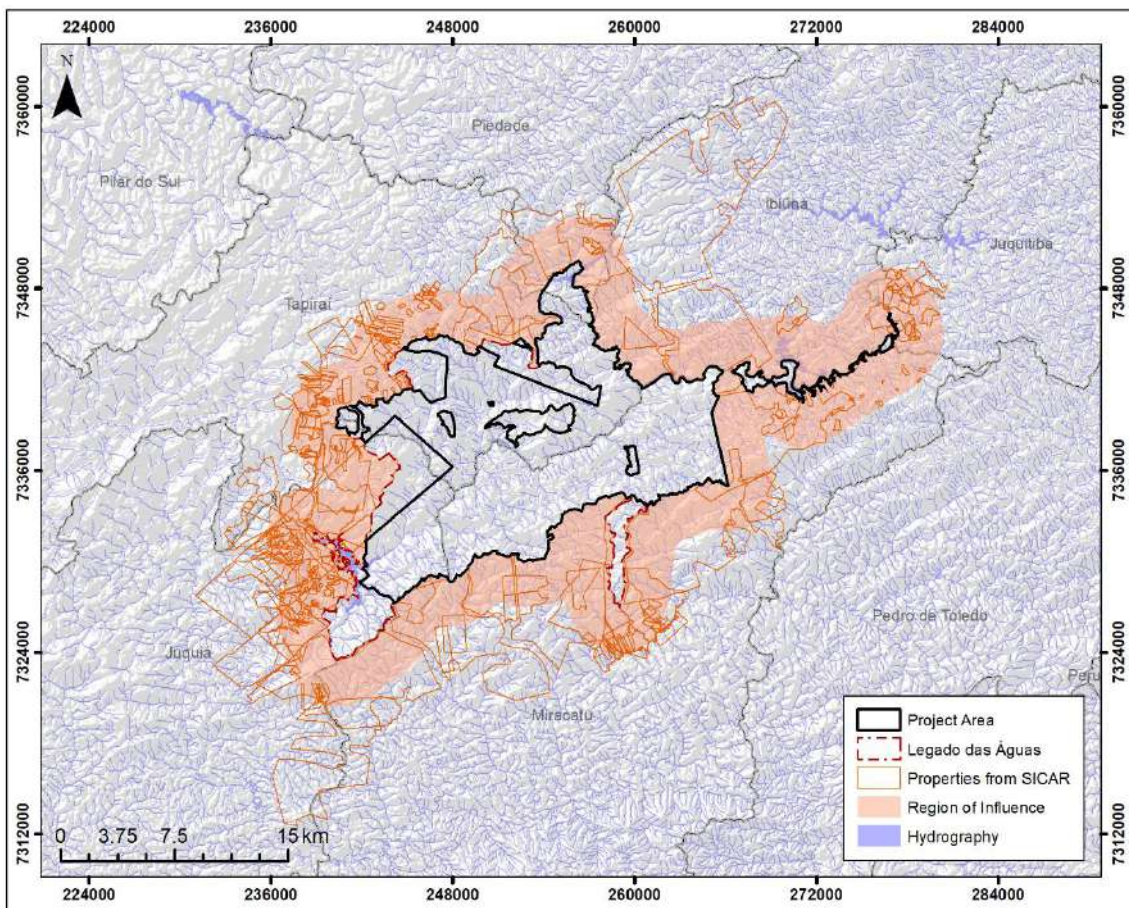
Source: SICAR/ CETESB.

From this delimitation, it was observed that, in addition to the rural properties registered in SICAR[8] in which their boundaries are completely inserted within the Region of Influence, there are partially overlapping properties, with boundaries that extrapolate the

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[8] Available at: https://www.car.gov.br/#/

3 km buffer. These properties were then incorporated, finally composing the Area of Influence.

The use of the Area of Influence will take place based on the suitability of each of the indicators, as will be presented in their respective items, which will indicate which configuration of the Area of Influence should be used for the relevant analyses, be it buffer, SICAR properties, or both.

1.10. CHARACTERIZATION OF THE PROJECT AREA

1.10.1. LOCATION

The Project Area is in the Atlantic Forest biome in an area called Legado das Águas, owned by the company Reservas Votorantim, located in the south of the State of São Paulo, between the municipalities of Juquiá, Juquitiba, Miracatu, Piedade and Tapiraí. The following figure illustrates the location and biome.

Figure 5. Location of Legado das Águas.
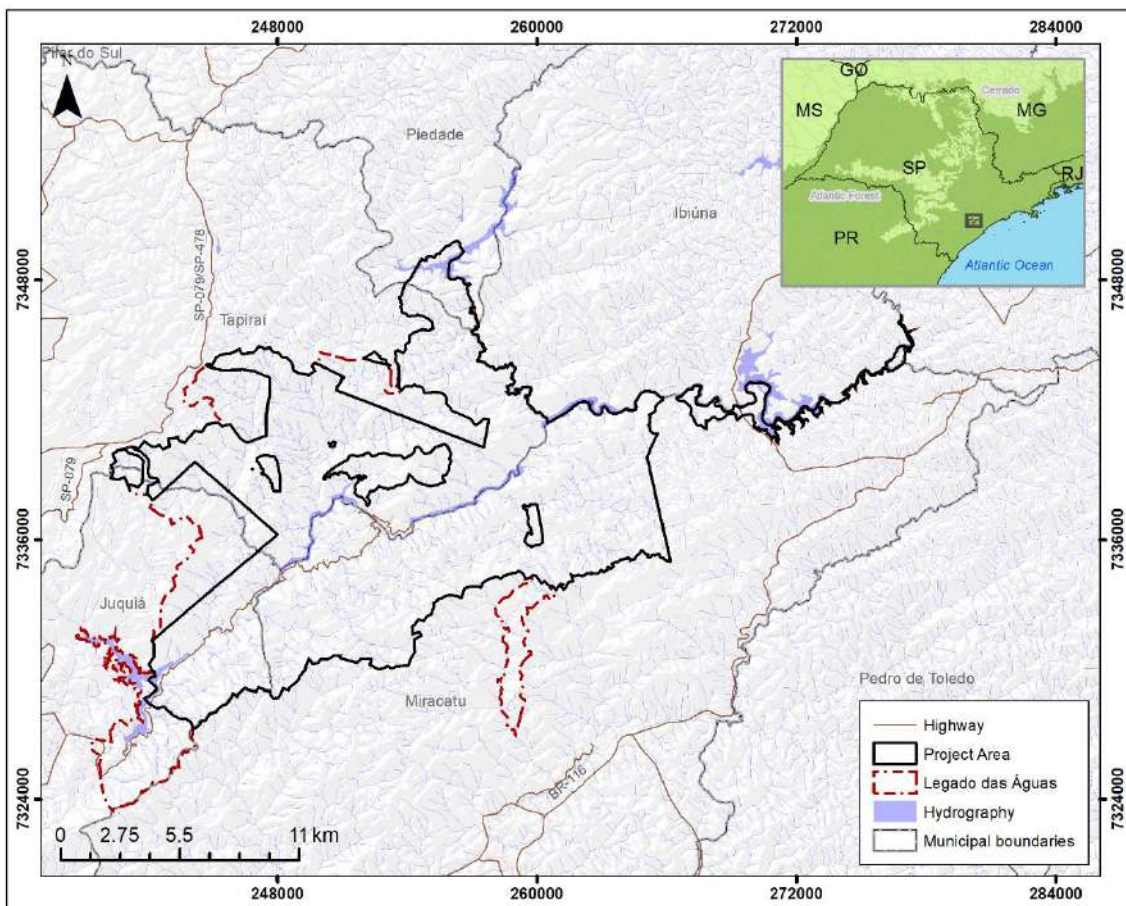
Source: IBGE/ CETESB.

Legado das Águas is located in Vale do Ribeira de Iguape region, which, in addition to the municipalities where Legado das Águas is located, also comprises: Apiaí, Barra do Chapéu, Barra do Turvo, Cajati, Cananéia, Eldorado, Iguape, Ilha Comprida, Iporanga, Itaóca, Itapirapuã Paulista, Itariri, Jacupiranga, Pariquera-Açu, Pedro de Toledo, Peruíbe, Registro, Ribeira, Ribeirão Branco, São Lourenço da Serra and Sete Barras.

The region receives its name from the Hydrographic Basin to which it belongs, the Basin of the River Ribeira de Iguape. This basin is part of the Water Resources Management Unit ("UGRHI") 11, managed by the Ribeira Iguape and Litoral Sul Hydrographic Basin Committee.

UGRHI 11 is composed of an extensive and rich hydrographic network, forming a drainage area in the basin region of about 17,000 km². The main rivers in the region are the Ribeira and its tributaries, Açungui, Capivari, Pardo, Turvo, Juquiá, São Lourenço, Jacupiranga, Itapirapuã, Uma da Aldeia and Itariri. The Juquiá River is the tributary that crosses the Legado das Águas area, allowing for the generation of electricity.

The Ribeira de Iguape River Basin can be subdivided into five main sub-basins, namely the Alto Juquiá, Itariri River, Vert Mar Norte, Ribeira Iguape River and Baixo Ribeira sub-basins. The Legado das Águas is mostly found in the central portion of the Alto Juquiá sub-basin (CETESB, 2016)[9], which is located in the upstream region of the Ribeira Iguape and Litoral Sul Basin, with a small stretch in the Itariri River sub-basin.

The main watercourses that flow within the Legado das Águas boundary are the Juquiá-Guaçu and Juquiazinho rivers, both flowing southwest. The reservoirs of the Fumaça, Barra, Porto Raso, Alecrim and Serraria Hydroelectric Power Plants are direct receivers of the waters of the Legado, as they use the waters of the Juquiá-Guaçu River, which follows its course until it becomes the Juquiá River in the municipality of Juquiá, now outside the confines of the Legado.

The figure below shows the hydrographic grid in the region of Legado das Águas and the scope of UGRHI 11.

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[9] CETESB – Environmental Company of the State of São Paulo. Hydrography Map According to Decree 10.755/77 – UGRHI 11. 2016. Available at <https://cetesb.sp.gov.br/aguas-interiores/wp-content/uploads/sites/12/2016/04/UGRHI11-subst-em-210616.pdf>.

Figure 6. Water Resources at Legado das Águas.
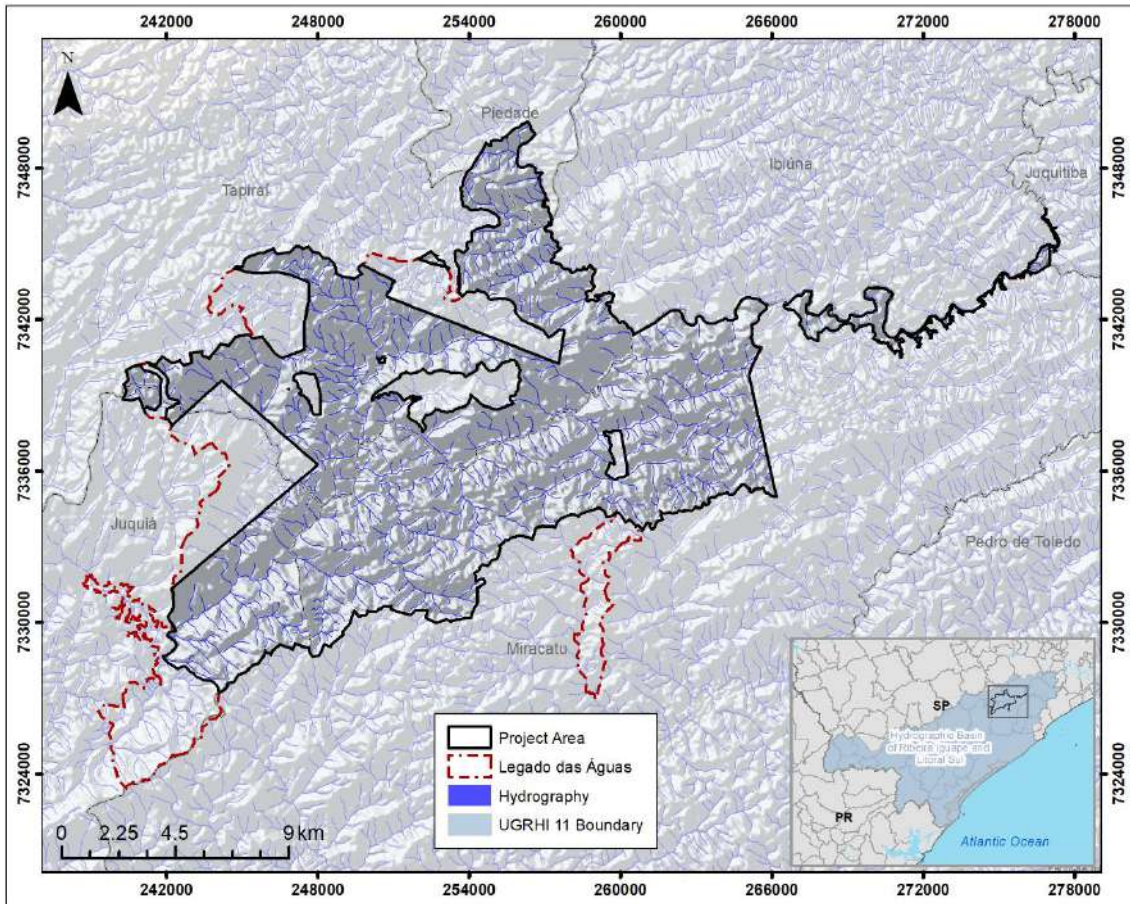
Source: DATAGEO/CETESB.

The water bodies in the municipalities of Tapiraí, Miracatu and Juquiá are the main direct beneficiaries of conservation in the area. However, its waters continue along the Juquiá River, maintaining a Southwest direction until it flows into the Ribeira de Iguape River, where it runs along the boundary between the municipalities of Registro and Sete Barras, where it also coincides with the delimitation between the Ribeira Iguape and Baixo Ribeira sub-basins. From this point on, its waters flow in a Southeast direction, crossing the municipality of Registro, passing through Iguape, until it flows into the Mar Pequeno, which ends in the Atlantic Ocean at Ilha Comprida (Figure 7).

Figure 7. Destination of the waters of Legado das Águas
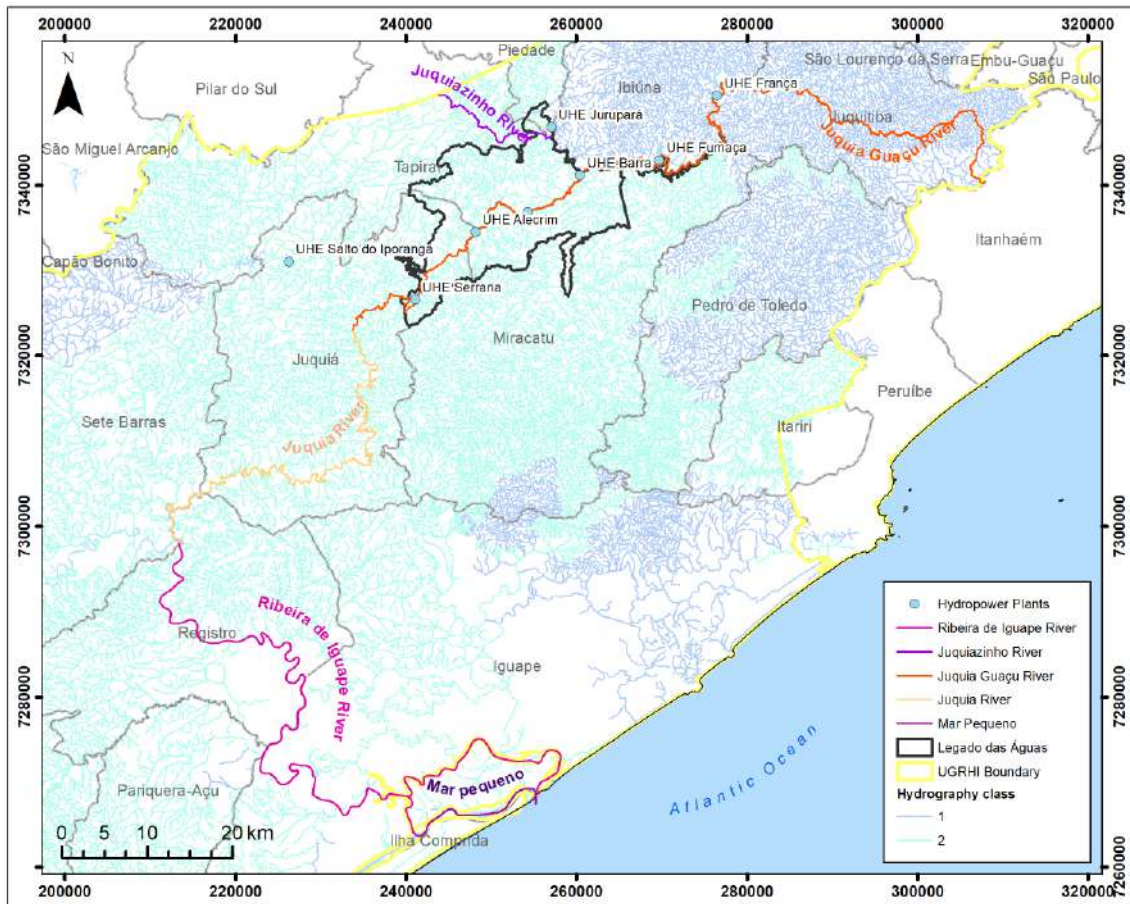
Source: CETESB

According to the Legado das Águas Strategic Management Plan (2016), and as can be seen in Figure 8, the relief altitudes in the Reservas Votorantim area vary from 15 to 961 meters (about 3153 ft), with very carved valleys and slopes so steep that in some zones reach 70 to 80% inclination. The lowest point of relief is found at the southwest border, the point at which the Juquiá river leaves the Legado areas and follows its course in the municipality of Juquiá, and its highest point is in the Água Doce mountain range, more specifically in Pico do Alecrim, head of the Alecrim River.

The crests of theSerra Água Doce form the northern limit of the reserve, with its southern slopes within the limits of the Legado area, where all the tributaries of the right bank of the Juquiá River originate, flowing towards the dams, except for the Rio do Peixe. Its predominant altitude varies from 600 to 800 meters (about 2625 ft), reaching 961 meters (about 3153 ft) at Pico do Alecrim.

The western limit of the Legado is delimited by the Guatambu mountain range, which has altitudes between 318 and 846 meters (about 2776 ft), with only its eastern slopes within the reserve area. The Serra do Rio Novo, with crests that constitute the watershed of the southern region of the Rio Novo micro basin, has a smaller range of altitudes, which vary from 400 to 650 meters (about 2133 ft).

Figure 8. Relief in the Legado das Águas region.
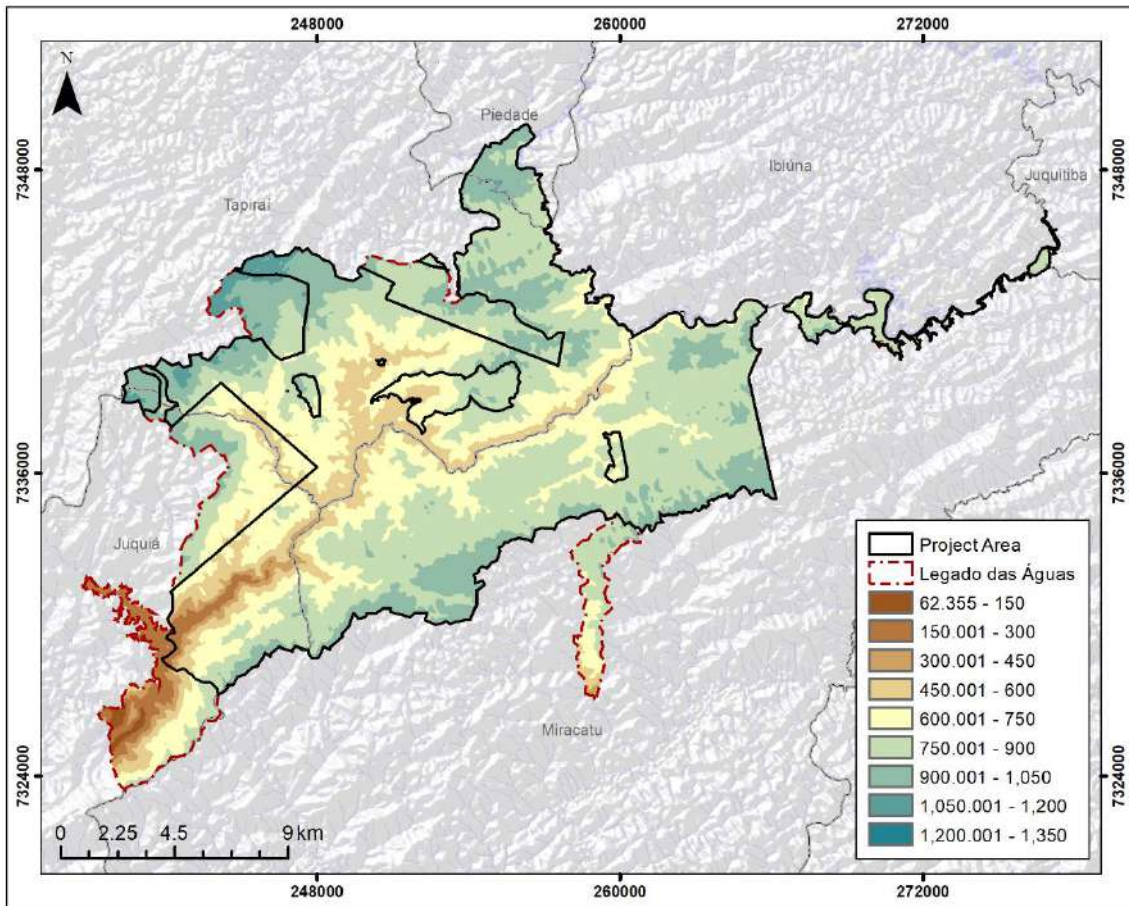
Regarding water supply and sewage, Table 6 presents the main characteristics related to the theme, referring to the municipalities where the Legado is located, as well as the municipalities which are the destination of Legado's waters.

Table 6. General information - municipalities which are the destination of Legado's waters

Munucipality (Year 2021)	Total Pop.	Urban Pop.	Rural Pop.	Urbanization rate	Total Pop. - water supply		Total Pop. - sewage		ICTEM
	hab.	hab.	hab.	%	hab.	%	hab.	%	0 - 10
Tapiraí	7,725	5,523	2,202	71.5%	5,511	71.3%	4,966	64.3%	7.39
Miracatu	19,511	10,030	9,481	51.4%	12,232	62.7%	10,546	54.1%	7.44
Juquiá	18,627	11,749	6,878	63.1%	13,675	73.4%	10,653	57.2%	6.74
Iguape	31,117	26,635	4,482	85.6%	20,652	66.4%	15,778	50.7%	5.49
Ilha Comprida	11,552	11,552	0	100.0%	10,403	90.1%	5,124	44.4%	5.00
Registro	56,463	50,124	6,339	88.8%	56,463	100.0%	53,282	94.4%	8.02
Sete Barras	12,731	7,039	5,692	55.3%	9,425	74.0%	7,551	59.3%	7.53

Source: Adapted from SNIS (2021)[10] and CETESB (2021)[11].

As can be seen in Table 6, the municipalities of Tapiraí, Juquiá and Miracatu have respectively 71.5%, 63.1% and 51.4% urbanization rates. Water supply rates follow a similar level to each other (71.3%, 73.4% and 62.7%, respectively) in which most households that receive this supply are urban (SNIS, 2021)[12]. Regarding the rural area, according to the Legado das Águas Strategic Management Plan (2016), there is a significant number of houses that are supplied by wells or springs.

However, when looking at the rates of sewage, the bottleneck is even greater, in Miracatu, for example, its connectivity to the sewage network is of only 54.1% of the population of the entire municipality, followed by 57.2% in Juquiá and 64.3% in Tapiraí (SNIS, 2021). According to the Strategic Plan for the Management of Legado das Águas (2016), it was identified that about 38.6% of households in Miracatu have irregular sewage discharge (rudimentary septic tank, ditch, or directly into rivers, lakes or sea), with rates of 36.8% in Juquiá and 23.0% in Tapiraí.

If we check only the urban population, the rate of sewage collection and treatment is higher compared to the rural population (CETESB, 2021). However, when checking the Sewage Collection and Treatability Indicator of the Urban Population of the Municipality - ICTEM (CETESB, 2021), only the municipality of Registro presents an indicator considered Good (8.02), with the rest presenting an indicator of Average, with the municipality of Ilha Comprida having the lowest value (5.00).

ICTEM evaluates the sanitation conditions of the urban population of the municipalities through five elements: collection; existence and efficiency of the collected sewage treatment system; the effective removal of the organic load in relation to the potential load; proper disposal of sludge and waste generated in treatment; the maintenance of

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[10] SNIS - National Sanitation Information System. Historical Series – 2021. Available at <http://app4.mdr.gov.br/serieHistorica/>.
[11] CETESB – Environmental Company of the State of São Paulo. ICTEM - Sewage Collection and Treatability Indicator of the Urban Population of the Municipality in 2021. Available at <https://datageo.ambiente.sp.gov.br/geoserver/datageo/ows?SERVICE=WMS>.
[12] SNIS - National Sanitation Information System. Historic Series – 2021. Available at < http://app4.mdr.gov.br/serieHistorica/>.

the class of the receiving body of the treated effluent; and direct and indirect release of untreated sewage. With this indicator, nominal values of organic load are transformed into comparable values between different contexts of each municipality (CETESB, 2020) [13].

Of all the municipalities where the waters of the Legado are destined, Registro is the most populous, in addition to being the second with the highest rate of urbanization (88.8%), second only to Ilha Comprida, the latter with its entire population in an urban area.

With regard to water quality, its classification is based on CONAMA Resolution 357/2005, which "deals with the classification of bodies of water and environmental guidelines for their classification, as well as establishing the conditions and standards for the release of effluents and makes other arrangements."

According to this Resolution, both Class 1 and 2 can be assigned to the protection of aquatic communities and primary contact recreation. However, Class 1 waters can be destined for supply for human consumption after only simplified treatment, while Class 2 water bodies need at least conventional treatment for the same purpose. In addition, Class 1 water resources are used directly for the irrigation of vegetables consumed raw and fruits (close to the ground) and that are eaten raw without removing the skin, in addition to serving to protect aquatic communities in Indigenous lands. As for Class 2, they may also have as their direct purpose the irrigation of vegetables and fruit plants, parks and gardens and others with which the public may come into direct contact, in addition to aquaculture and fishing activities.

UGRHI 11 has watercourses that are classified mainly in Class 2, with some points on the limits of the basin being Class 1. It is possible to notice that the water bodies found in more preserved regions, as in the case of Carlos Botelho State Park, Intervales State Park, Alto Ribeira Tourist State Park – PETAR, Caverna do Diabo State Park, Rio Turvo State Park, Lagamar de Cananeia State Park, Jureia-Itatins Ecological Station, and/or higher altitude regions, that sometimes, despite not being fully preserved, as in the case of the area upstream of the Legado das Águas, they are classified as Class 1. On the other hand, all water bodies from the limits of the Legado to its mouth, in the sea at Ilha Comprida, are classified as Class 2 (Figure 7) (CETESB, 2021).

Regarding the economic activities carried out in the Vale do Ribeira region, where the Legado is located, the predominance of the service sector stands out, followed by agriculture, with emphasis on peach palm, banana, tea, cattle, buffaloes, ornamental plants, mining and related industries (cement, lime, sand and gravel for construction), tourism and fishing in coastal municipalities.

The income of the population in this region is low and part of the population receives social assistance, such as Bolsa Familia. In 2014, the São Paulo Index of Social Responsibility (IPRS) assessed the living conditions of the population based on three dimensions: wealth, longevity and education, and 12 municipalities were in the group considered the most critical, municipalities with low wealth, low longevity and low education. The municipalities that present this critical scenario are: Apiaí, Barra do Turvo, Iporanga, Itapirapuã Paulista, Itariri, Juquiá, Juquitiba, Miracatu, Pariquera-Açú,

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[13] CETESB – Environmental Company of the State of São Paulo. Appendix D - Water Quality Indexes - Inland Water Quality in the State of São Paulo. 2020. Available at < https://cetesb.sp.gov.br/aguas-interiores/wp-content/uploads/sites/12/2020/09/Apendice-D-Indices-de-Qualidade-das-Aguas.pdf >

Ribeira, Sete Barras and Tapiraí[14]. In 2018, the IPRS classified 100% of the population of Juquiá and Miracatu as vulnerable, which are the most disadvantaged municipalities in the State, both in terms of wealth and social indicators (low longevity and education), and 100% of the population of Tapiraí as in transition, which are municipalities with low levels of wealth and intermediate indicators of longevity and/or education (low levels). [15]

1.10.2. COMPLIANCE WITH ELIGIBILITY CRITERIA

This item describes and supports how the Project Area meets each of the eligibility criteria listed and described in item 1.7, according to the Methodology.

1.10.2.1.   DOCUMENT REGULARITY

In accordance with the provisions of item *Document regularity*
, it is mandatory to present (i) Property registration(s) and (ii) CAR of the property, for compliance analysis of the selected properties. This report also presents some certificates listed in item 1.7.

The following tables present the received documents and associated information, from each of the 6 (six) lands that make up the Legado das Águas, called Estirões, Fumaça, Juquiá-Travessão, Jurupará, Primavera and Serraria and from Reservas Votorantim.

Table 7. List of documents from the areas that make up the Legado das Águas.

Property	Document	Date	Source	Size (ha)	Owner	Observations
Estirões	Property registration No.1517	07/26/2016	Official Registry of Real Estate and Documents - Municipality of Miracatu.	19,802.4	CBA	-
	SICAR-SP No. 35299060226453	10/29/2021	SIGAM/ SIMA - SP	724.3443	CBA	Status of environmental suitability: "under registration".
	Descriptive memorial INCRA – INCRA/SNCR Code No. 6410653235866	03/23/2015	INCRA	724.4698	CBA	-
Fumaça	Property registration transcription No.11629	11/29/2016	Official Registry of Real State and Documents - Municipality of São Roque.	680.02	CBA	-
	Private purchase and sale agreement	n.a.	-	n.a.	-	Buyer: CBA
	Deed No. 45, pg 12v, 65, 63, 67, 86v	May,July and August, 1958	Civil Registry and Notary Office of Ibiúna/SP	90.34 (Pg 12) 72.6 (Pg 63) 145.20 (Pg 65) 60.05 (Pg 67) 24.20 (Pg 86v)	CBA	-
	Public Deed Certificate	n.a.	5th Notary Office of the City of São Paulo	680.02	CBA	Document refers to areas A, B, C and D.

Property	Document	Date	Source	Size (ha)	Owner	Observations
	SICAR-SP No. 35299060226332	10/29/2021	SIGAM/ SIMA – SP	503.6147	CBA	Status of environmental suitability: "under registration".
	Descriptive memorial INCRA – INCRA/SNCR Code No. 6370333235009	05/11/2015	INCRA	503.6987	CBA	
Juquiá-Travessão	Transcription No. 20078	10/19/2020	3rd Property Registry Office of Santos	-	RESERVAS VOTORANTIM LTDA.	-
	Property registration No.23189	12/07/2020	Real Estate Registration Service – Judicial District of Piedade	123.4423		-
	Property registration No.23190	12/07/2020	Real Estate Registration Service – Judicial District of Piedade	476.0796		-
	Property registration No.23423	12/15/2020	Real Estate Registration Service – Judicial District of Piedade	656.6493		-
	Property registration No.23877	12/15/2020	Real Estate Registration Service – Judicial District of Piedade	612.4075		-
	Property registration No.23878	12/15/2020	Real Estate Registration Service – Judicial District of Piedade	43.6956		-
	Property registration No.23879	12/15/2020	Real Estate Registration Service – Judicial District of Piedade	626.3114		According to information from Reservas Votorantim, the registration in question overlaps with the area in Primavera, with

Property	Document	Date	Source	Size (ha)	Owner	Observations
						around 148 ha in Primavera and around 478.6166 ha in Juquiá-Travessão.[16]
	Property registration No.23880	12/15/2020	Real Estate Registration Service – Judicial District of Piedade	641.8899		-
	Property registration No.23881	12/15/2020	Real Estate Registration Service – Judicial District of Piedade	21,5089		-
	Property registration No.23882	12/15/2020	Real Estate Registration Service – Judicial District of Piedade	0.4589		-
	Property registration No.23883	12/15/2020	Real Estate Registration Service – Judicial District of Piedade	661.4777		-
	Property registration No.23904	12/15/2020	Real Estate Registration Service – Judicial District of Piedade	226.3818		-
	Property registration No.23905	12/15/2020	Real Estate Registration Service – Judicial District of Piedade	226.1813		-
	Property registration No.23906	12/15/2020	Real Estate Registration Service	40.9089		-

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[16] It should be noted that the overlap is due to an agreement with former squatters, in which the area was transferred to the ownership of RESERVAS VOTORANTIM LTDA.

Property	Document	Date	Source	Size (ha)	Owner	Observations
			– Judicial District of Piedade			
	Property registration No.23907	12/15/2020	Real Estate Registration Service – Judicial District of Piedade	55.3408		-
	Property registration No.23908	12/15/2020	Real Estate Registration Service – Judicial District of Piedade	108.1813		-
	SICAR-SP No.35299060237581	10/29/2021	SIGAM/ SIMA - SP	25,292.1597	CBA	
	Gleba A - Descriptive memorial INCRA –INCRA/SNCR Code No. 6410653234703	12/12/2017	INCRA	17,734.7918	CBA	-
	Gleba B - Descriptive memorial INCRA –INCRA/SNCR Code No. 6410653234703	12/05/2017	INCRA	107.3105	CBA	-
	Environmental Declaratory Act nº 12135353903536	09/08/2021	IBAMA	5,312.200	RESERVAS VOTORANTIM LTDA.	Fiscal year 2021
	SICAR SP-3553500-223E271600BE4E9B91363C3C92594CF1 (State CAR No.: 35535000176056)	04/03/2019	SICAR	3,999.05		Regarding property registrations No.: 23.423, 23.878, 23.879, 23.880, 23.881, 23.882, 23.883, 23.877, 23.904, 23.905, 23.903, 23.907, 23.908, Possession (Tr. 935, 8.478 and 11.364).
	SICAR SP-3553500-76ED814E08AA4F9087CDC103F44FA147(State CAR No.: 35535000317776)		SICAR	655.10	RESERVAS VOTORANTIM LTDA.	Regarding property registration No. 23.423.
	SICAR SP-3553500-6E126091E0A34FCC963594641C76D30F (State CAR No.: 35535000371380)		SICAR	247.06		Regarding property registration No. 23.423.

Property	Document	Date	Source	Size (ha)	Owner	Observations
	SICAR SP-3553500-510B5D712D214DF1910AB90CC01DE2C1 (State CAR No.: 35535000089982)		SICAR	608.25		Regarding property registrations 23.189 and 23.190
Jurupará	Transcription No. 3873	11/24/1975	Real Estate Registry Office and Attachments - Judicial District of São Roque	n.a.	n.a.	-
	SICAR-SP No.35535000227158	10/29/2021	SIGAM/ SIMA - SP	2,150.7915	CBA	Status of environmental suitability: "under registration".
	Area A - Descriptive memorial INCRA –INCRA/SNCR Code No. 6370333235351	07/18/2018	INCRA	2164.2971	CBA	-
	Area B - Descriptive memorial INCRA –INCRA/SNCR Code No. 6370333235351	11/22/2017	INCRA	2,484.6124	CBA	-
	CCIR No. 21406641199	02/15/2019	INCRA	5,403.8000	CBA	Fiscal year 2018
Primavera	Deed of purchase and sale. Book 888 pg 257	12/13/1979	20th Notary Office - State of São Paulo Judicial District of the Capital	1,282.60	CBA	-
	SICAR-SP No. 35535000228550	10/29/2021	SIGAM/ SIMA - SP	720.2052	CBA	Status of environmental adequacy: "awaiting change/completion of information".
	Descriptive memorial INCRA – INCRA/SNCR Code No. 6410653234703	05/15/2018	INCRA	463.9803	CBA	-
Serraria	Private Sale and Purchase Agreement – Area of 2.56 ha	06/05/1978	-	14.52	CBA	-
	Private Sale and Purchase Agreement – Area of 10.3553 ha	06/05/1978	-	31.4	CBA	-
	Promise of Sale and Purchase Agreement, Promise of Assignment of Rights and Promise of	08/14/1971	-	27.76	CBA	-

Property	Document	Date	Source	Size (ha)	Owner	Observations
	Assignment and Transfer of Possession					
	Deed – Book 429 pg 52v	10/30/1968	20th Notary Office - State of São Paulo Judicial District of the Capital	27.76	CBA	-
	Deed – Book 401 pg 62	11/17/1967	20th Notary Office - State of São Paulo Judicial District of the Capital	n.a.	CBA	-
	Deed – Book 401 pg 93	09/22/1969	20th Notary Office - State of São Paulo Judicial District of the Capital	535.00	CBA	-
	Deed – Book 469 pg 83	01/30/1969	20th Notary Office - State of São Paulo Judicial District of the Capital	121.00	CBA	-
	Deed – Book 498 pg 28v	07/30/1969	20th Notary Office - State of São Paulo Judicial District of the Capital	18.6	CBA	-
	Deed – Book 888 pg 257	12/13/1979	20th Notary Office - State of São Paulo Judicial District of the Capital	1,282.60	CBA	-
	Deed – Book 401 pg 89v	07/01/1969	20th Notary Office - State of São Paulo Judicial District of the Capital	27.76	CBA	-
	Property registration No. 403	02/07/1979	Judicial District of Juquiá	29.27	CBA	-
	Transcription No. 146	07/21/1969	Judicial District of Juquiá	27.76	CBA	-

Property	Document	Date	Source	Size (ha)	Owner	Observations
	Descriptive memorial INCRA – INCRA/SNCR Code No. 6410653234622	10/20/2014	INCRA	1647.0243	CBA	-
	SICAR No. 35261000227053	10/29/2021	SIGAM/ SIMA - SP	1,626.4742	CBA	Status of environmental suitability: "under registration".

The following table presents the certificates on behalf of Reservas Votorantim LTDA in order to verify the absence of judicial or administrative proceedings in its name.

Table 8. List of certificates of the areas that make up the Legado das Águas.

Corporate Name	CNPJ	Certificates	ID	Emission date	Source	Observations
Reservas Votorantim LTDA	23.613.510/ 0002-10	General Civil Distribution Certificate - up to 10 years	66430858	05/25/2023	Court of Justice of São Paulo - TJSP	
	23.613.510/ 0002-10	State Certificate of Criminal Distributions	1895959	05/25/2023	Court of Justice of São Paulo - TJSP	No record
	23.613.510/ 0002-10	Clearance Certificate of Labor Debts	22632470/2023	05/25/2023	Labor Court of the 2nd Region - TJT 2nd Region SP	No record
	23.613.510/ 0001-30	Federal Revenue Debt Certificate	92C0.D0C0.FB8F.964B	05/22/2023	Federal Revenue of Brazil	Certificate issued for the head office's CNPJ.
	23.613.510/ 0002-10	Clearance Certificate of Environmental Debts	-	05/25/2023	SICAFI - Registration, Collection and Inspection System of IBAMA	No record
	23.613.510/ 0002-10	Embargo Clearance Certificate	FV9TCKZM2TJQIZ5Z	05/25/2023	Public Consultation of Embargoed Areas - IBAMA	No record

Property registration, property registration transcripts, contracts, CARs and descriptive memorials of Legado das Águas were analyzed. Differences were identified between the extensions declared in property documents (registrations and transcripts) and the CAR. Considering this, even if the differences do not represent irregularities of a legal nature and, therefore, do not infringe the rules of the Methodology, they will need to be corrected during the PSA Carbonflor.

By consulting the SICAR online system, CARs overlapping the Legado das Águas area were identified. Considering that the SICAR system allows the creation of overlapping CARs, without analyzing the accuracy of data or ownership of the declarant, these overlaps do not violate the rules of the Methodology. However, they will need to be checked and monitored.

It should be noted that, as informed by Reservas Votorantim, the regularization of registrations and other property documents, as well as the CARs of the areas comprising Legado das Águas, are in progress. The company also informed that the areas registered in the CARs presented in the table above reflect the official composition of Legado das Águas and have been used for 10 years.

Still according to information from Reservas Votorantim, the properties owned by CBA were transferred, by amendment of the Articles of Association[17], to Reservas Votorantim, pending registration annotation. It should be noted that what was developed here was a transcription of the main information of the documents on the date they were forwarded.

1.10.2.2. OVERLAP WITH PROTECTED AREAS

For the analysis of the overlap with protected areas, as described in item 1.7.2, secondary databases made available by official bodies were consulted. The data is listed below, and the overlaps found can be seen in the figure below.

    i. Cavities and caves
    ii. Geological sites
   iii. Archaeological sites
   iv. Indigenous Territories
    v. Quilombola Territories
   vi. Conservation Units

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[17] 12th Contractual Amendment of Reservas Votorantim, registered with the Board of Trade of the State of São Paulo - JUCESP on 08.04.2021. This document has been reviewed and is in order. In it, the first clause determines the increase in the company's capital stock, paid in, in part, by the properties: Fazenda Estirões, Fazenda Fumaça, Fazenda Juquiá-Travessão, Fazer Jurupará, Fazenda Primavera and Fazenda Serraria.

Figure 9. Overlap analysis in the Project Area.
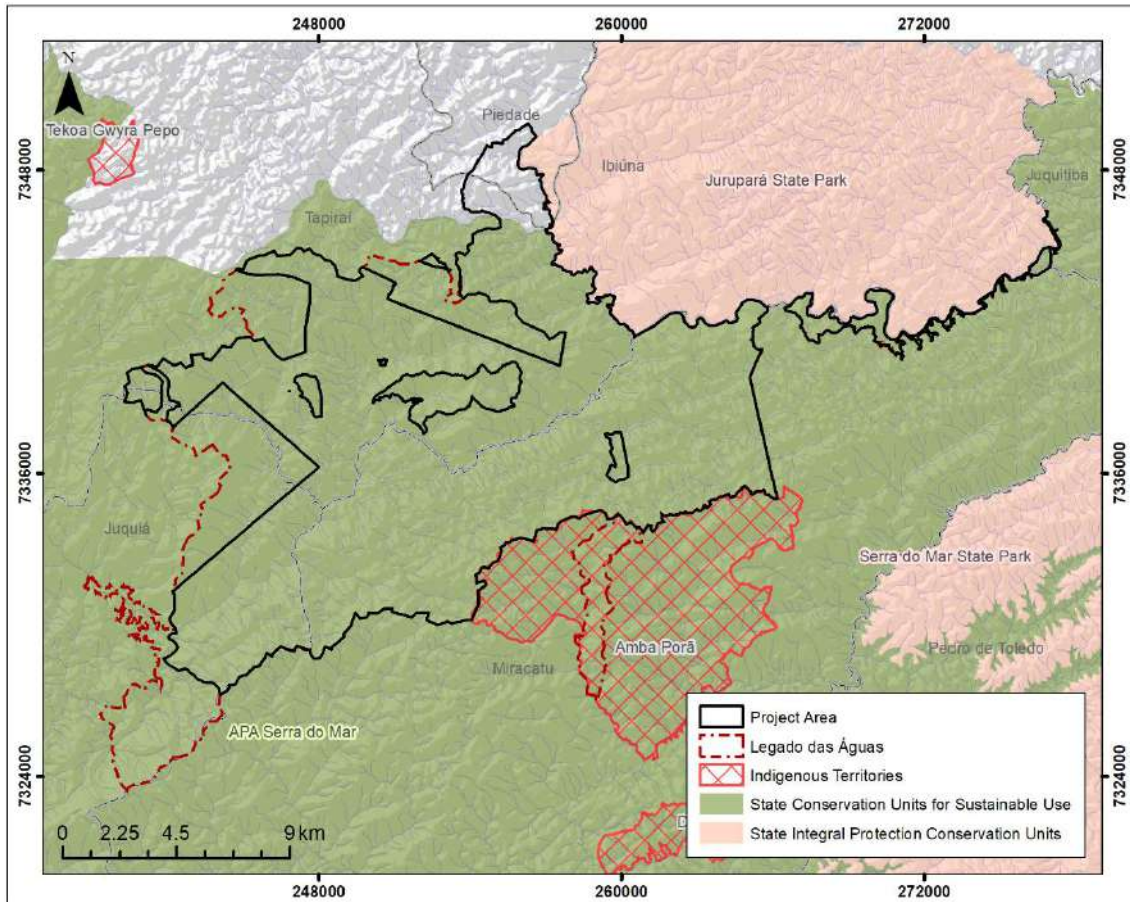
Source: MMA/ FUNAI/INCRA/CETESB.

It can be observed that Legado das Águas almost completely overlaps the "APA Serra do Mar" [Serra do Mar Environmental Protection Area], created on September 21, 1984, by State Decree No. 22,717 and classified as a Sustainable Use Conservation Unit, whose objective is to make nature conservation compatible with the sustainable use of part of its natural resources. Such units aim to reconcile the exploration of the environment with the guarantee of perpetuity of renewable natural resources considering the ecological processes, in a socially just and economically viable way. [18] It should be noted that this overlap does not prevent the development of the PES project under the terms of the Methodology.

To the Northeast, Legado das Águas borders and does not overlap with the Jurupará State Park, a State Conservation Unit of Full Protection created on September 22, 1992, by State Decree No. 35,703.

In the southeast portion of the Legado, in the municipality of Miracatu, there is part of the Amba Porã Indigenous Land, where the indigenous people who live there are called Guarani and/or Guarani-mbya. Its demarcation took place under Funai/BSB Process No. 08620.001739/2006-47, with four Administrative Challenges being presented to the procedure: Funai/BSB Process No. 08620.001314/2019-52 (City Hall of Miracatu); Funai/BSB Process No. 08620.160214/2015-33 (Miracatu Rural Union); Funai/BSB Process No. 08620.160231/2015-71 (Greensolutions Serviços Ambientais Ltda – ME);

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[18] Available at: https://www.icmbio.gov.br/portal/unidadesdeconservacao/grupos

Funai/BSB Process No. 08620.160266/2015-18 (Companhia Brasileira de Alumínio (CBA) – Votorantim Group)". It should be noted, however, that, currently, the legal situation of the demarcation process of Aldeia Amba-Porã is considered as "Identified/Approved", insofar as the studies for the identification and demarcation of the village were approved through the Dispatch No. 87/2016 of the FUNAI Presidency.

No overlaps of cavities and caves, geological sites, archaeological sites and/or Quilombola territory were identified within the limits of the Legado area.

1.10.2.3.   APPLICATION IN PPA AND LR

As provided in the item *Application in legal reserve and permanent preservation Areas*, the RMCMR will consider the PPA and LR areas of the Project Area.

By consulting SICAR, the polygons corresponding to PPAs, LRs and location of springs in the Legado das Águas Project Area were obtained. The figure below shows this relationship.

Figure 10. Location of PPAs and LRs within the Legado das Águas Project Area.
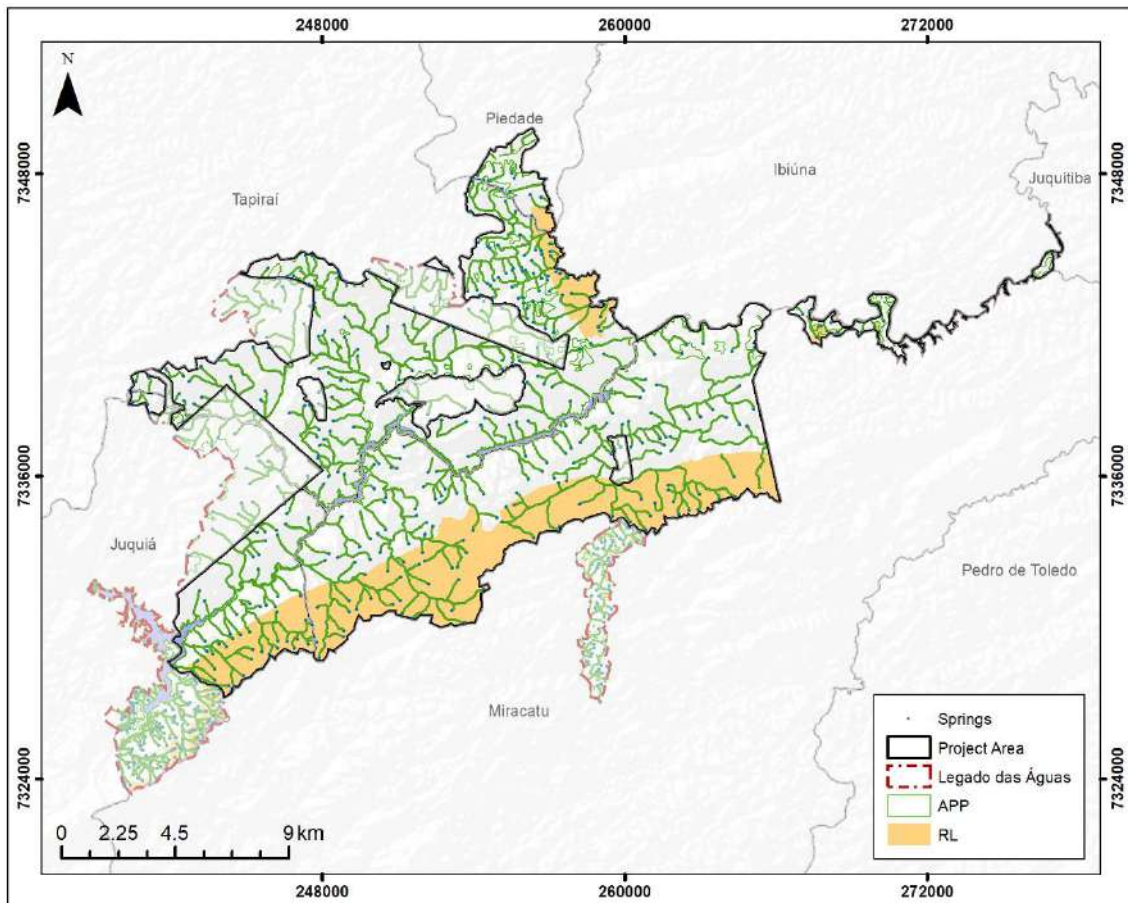
Source: SICAR.

The table below shows the areas of PPA and LR of each property registered in the SICAR of São Paulo and that together, form the Legado das Águas Project Area, according to the received documents.

Table 9. Areas of the CAR that make up Legado das Águas Project Area.

Property name	Property Registration No. (SICAR)	Total Area (ha)	PPA (ha)	LR (ha)
Fumaça	SP-3529906-742E55C12C564667A068E624E9948641	503.61	69.6	75.84
Juquiá - Travessão	SP-3529906-EB926A7FC175445887D1823EE74E6C0F	25,386.92	2,987.59	5,064.46
Jurupará	SP-3553500-6189ACDA7B3A4C95BC644871EC6C7475	2,166.10	517.14	421.39
Primavera	SP-3553500-6F3E9385174B4364AF434EFA39CF1D9E	727.77	134.22	139.28
TOTAL		**28,784.40**	**3,708.55**	**5,700.97**

It should be noted, according to the documents presented in item 1.10.2.1, that there are 4 CARs overlapping the area called Juquiá-Travessão, they are:

- SP-3553500-223E271600BE4E9B91363C3C92594CF1;
- SP-3553500-76ED814E08AA4F9087CDC103F44FA147;
- SP-3553500-6E126091E0A34FCC963594641C76D30F;
- SP-3553500-510B5D712D214DF1910AB90CC01DE2C1.

Reservas Votorantim informed that the regularization process of such properties has begun, and the corresponding property registrations were transferred to the new ownership of the Reserva.

1.10.2.4. HISTORY OF LAND USE AND LAND COVER IN THE LAST 10 YEARS

To verify the eligibility of the Legado das Águas, figures were generated based on geospatial data of forest cover and the history of land use beginning from the year 2008, generating figures representing the area for the years 2008, 2012, 2015, 2017 and 2018, with delimitation of the following uses:

- Forest formation
- Silviculture (monoculture)
- Wetlands
- Pasture
- Mosaic of uses
- Other non-vegetated areas
- River, lake, and ocean
- Other temporary crops

The historical data used for the analysis of the forest cover in Legado das Águas and in the respective Project Area indicate that there has been no significant change in the forested areas since 2008, maintaining the rain forest in almost 100% of the Project Area.

The following images, based on the analysis of the data provided by the MapBiomas project, allow verifying the forest cover in Legado das Águas over the years of analysis.

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Figure 11. Forest cover of Legado das Águas in 2008.
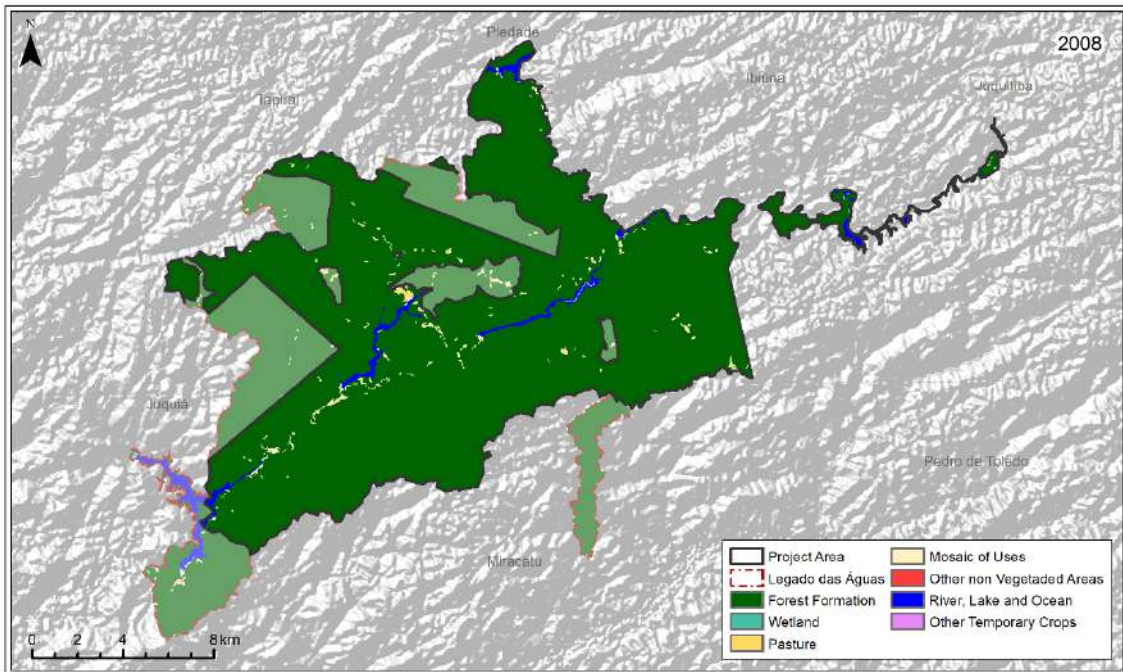
Source: MapBiomas - Collection 7 of land use and land cover.

Figure 12. Forest cover of Legado das Águas in 2012.
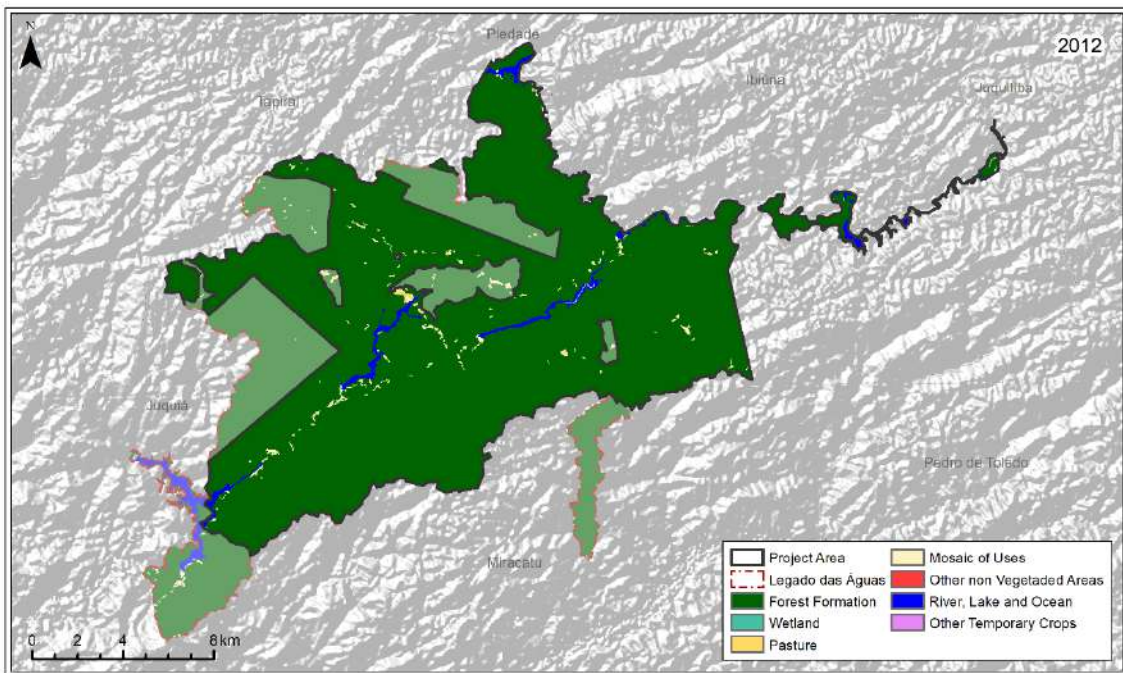
Source: MapBiomas - Collection 7 of land use and land cover.

Figure 13. Forest cover of Legado das Águas in 2015.
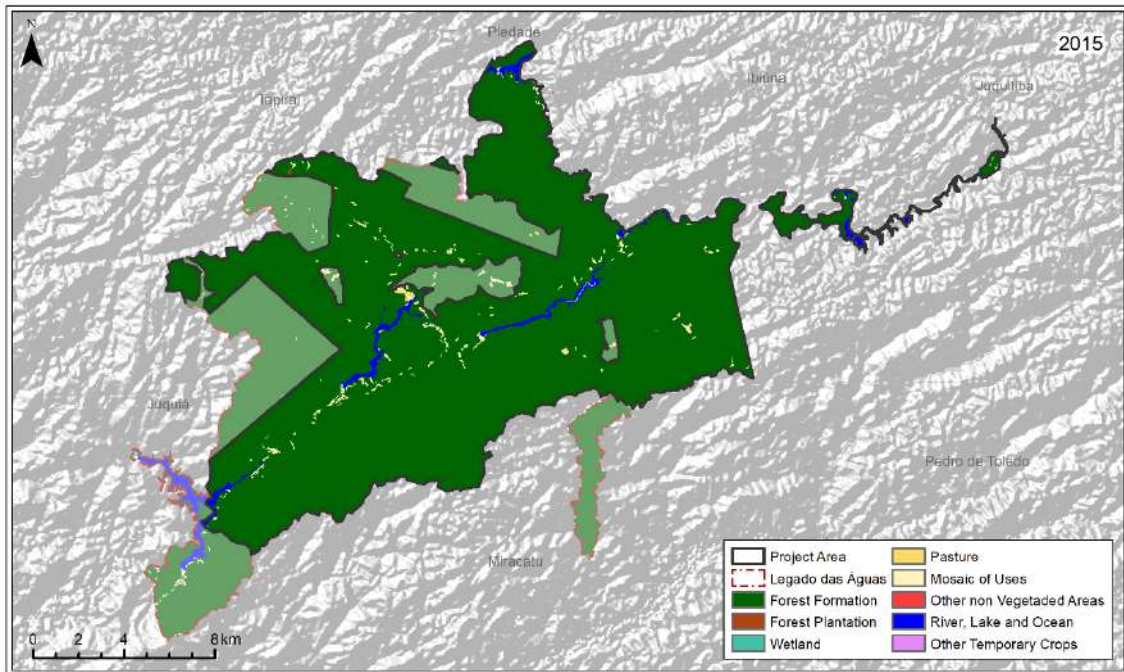
Source: MapBiomas - Collection 7 of land use and land cover.

Figure 14. Forest cover of Legado das Águas in 2017.
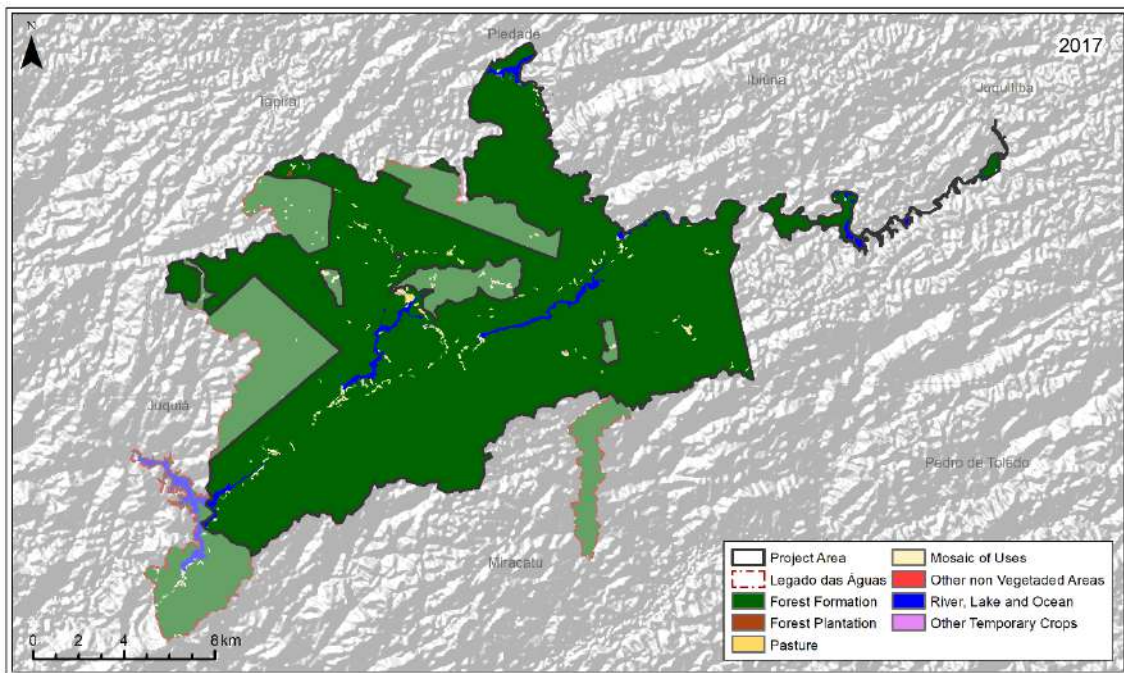
Source: MapBiomas - Collection 7 of land use and land cover.

Figure 15. Forest cover of Legado das Águas in 2018.
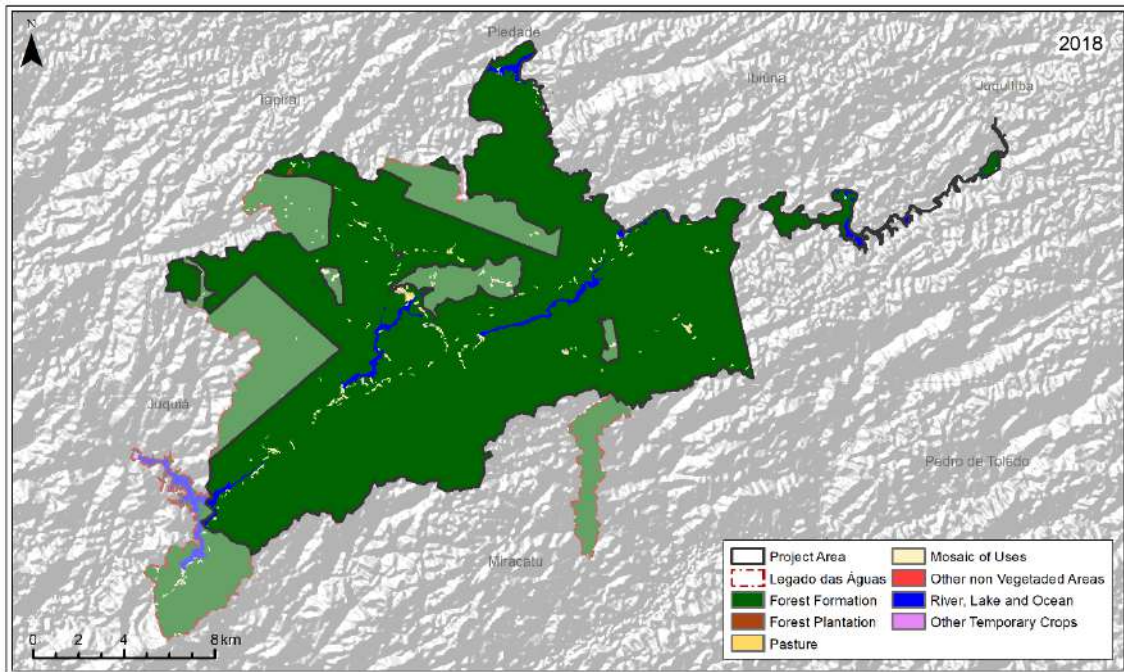
Source: MapBiomas - Collection 7 of land use and land cover.

As mentioned, the changes are not significant in the forest cover mapping of the Project Area. The following table shows the proportion of land uses (in hectares) detected in the Project Area for the years 2008 and 2018. The transition matrix shows, in its lines, the areas assigned to each land use in 2008, while the columns show land use area in 2018.

Table 10. Land use matrix of Legado das Águas Project Area in 2008 and 2018.

	Classes	2018							
		Forest formation	Mosaic of uses	Other non-vegetated areas	Other temporary crops	Pasture	River, lake, and ocean	Silviculture (monoculture)	Total
2008	**Forest formation**	23.075,44	51,29	2,75	0,16	7,92	4,59	23.142,15	23.075,44
	Mosaic of uses	77,94	174,39	14,40	3,85	1,36		271,93	77,94
	Other non-vegetated areas	0,08	1,39	0,33				1,80	0,08
	Other temporary crops	0,66	1,15	0,82	0,16			2,78	0,66
	Pasture	1,29	12,07	6,34	14,66			34,36	1,29
	River, lake, and ocean	13,67	2,09	0,08		470,79		486,63	13,67
	Total	23.169,08	242,38	24,71	18,83	480,07	4,59	23.939,66	23.169,08

It can be observed that the Forest Formation class has a difference of 66.71 hectares over the 11 years analyzed, which corresponds to an increase in Forest Formation over time. Other non-forest uses have little expressive occupation in the Project Area, as can be seen in the figures above and evidenced in the table.

1.10.3. LAND USE AND LAND COVER

Legado das Águas is mostly covered by native vegetation. In the reserve, in addition to part of the Amba Porã Indigenous Land, there are: a traditional community called "Comunidade Ribeirão das Antas" and other villages and communities (Vila Verde, Morro Pelado, Salve Floresta, Bairro Alecrim and Guatambu).

There are also infrastructure works corresponding to: 5 (five) small hydroelectric power plants, power substation, transmission towers, overhead power lines and associated right of way, an inn with structures for tourism and a main building.

The figure below shows the informed land uses that make up the Legado das Águas area and the respective Project Area.

Figure 16. Land use and Land Cover in Legado das Águas.
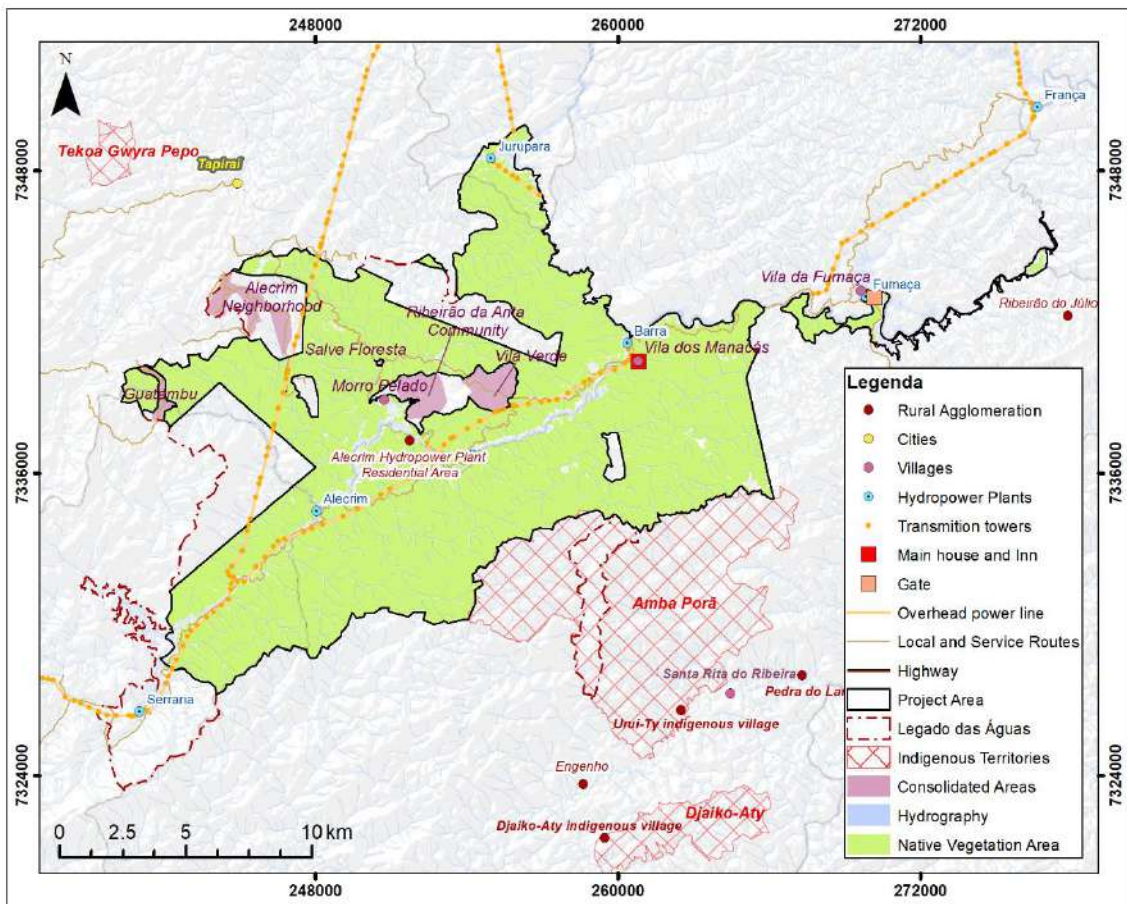
Source: INCRA/IBGE.

1.10.4. FAUNA AND FLORA

The Atlantic Forest is one of the world's richest biomes regarding biodiversity, it is considered one of the world's hot spots, that is, priority for biodiversity conservation. On the other hand, it is also one of the most threatened biomes by anthropic action. It has been converted since Brazil's colonization, having been reduced to less than 12.4% of its original size [19].

The biome has a high rate of endemism, that is, it has several species of fauna and flora with distribution restricted to the Atlantic Forest. The currently known endemic fauna is mainly composed of vertebrates, more specifically reptiles, amphibians, birds, and mammals[20]. There is also a notable diversity of invertebrate animals and fungi, but knowledge about these species is still very scarce.

Legado das Águas, located in Vale do Ribeira, is in a portion of extreme environmental importance for the State of São Paulo and for the domain of the Atlantic Forest, since, together with the Conservation Units present in Vale do Ribeira, they represent together the largest remnant of conserved forest in the biome. It is the largest continuum of the Atlantic Forest Biome, located in the south of the state, forming a complex and relevant ecological corridor.

The predominant phytophysiognomy in Legado das Águas is the Dense Ombrophilous Montane Forest, followed by the Dense Ombrophilous Submontane Forest, both present in mountainous terrains with high precipitation and humidity and absence of a pronounced dry period. The following figure presents the phytophysiognomies and biome covered by the Project Area and surroundings.

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[19] Available at: https://cms.sosma.org.br/wp-content/uploads/2021/05/SOSMA_Atlas-da-Mata-Atlantica_2019-2020.pdf
[20] Available at: https://www.ibflorestas.org.br/bioma-mata-atlantica

Figure 17. Phytophysiognomies and Biome in Legado das Águas.
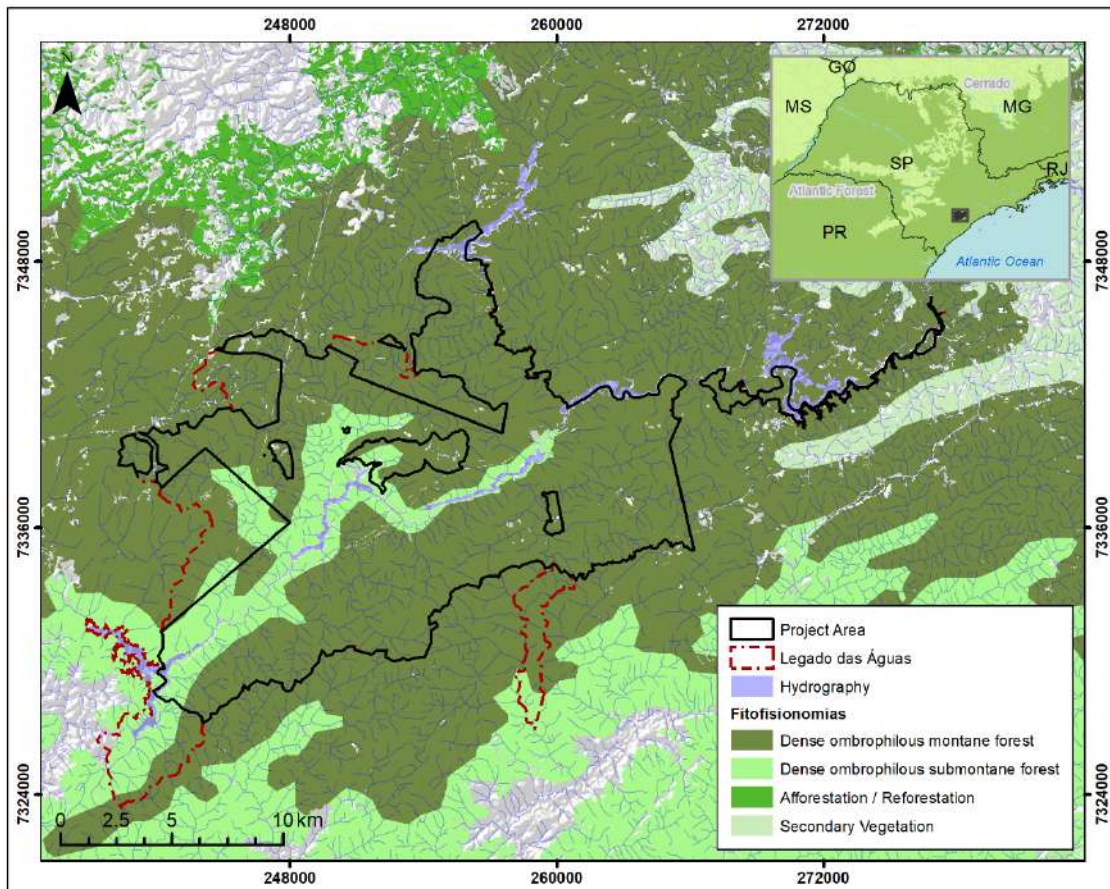
Source: BDIA/IBGE/ MMA.

Dense Ombrophilous Montane Forest and Dense Ombrophilous Submontane Forest present different phytophysiognomies, according to variations in altimetric ranges. The Dense Ombrophilous Montane Forest, in general terms, presents a forest structure with a uniform canopy (around 20 m), represented by relatively thin ecotypes with thick and rough bark, small leaves and leathery consistency. The Dense Ombrophilous Submontane Forest is occupied by a forest formation with a uniform canopy with phanerophytes around 30 m. The sub forest is made up of naturally regenerating seedlings, few nanophanerophytes and camephytes, in addition to the presence of small palm trees and herbaceous lianas in greater numbers.

In Legado das Águas, the Dense Ombrophilous Montane Forest and Dense Ombrophilous Submontane Forest present a uniform and continuous canopy, with well-defined stratification, ranging from ferns and lycophytes to angiosperms, with the presence of epiphytes (Colletta et al, 2016) [21].

Legado das Águas promotes and contributes to the development of programs and research projects related to the conservation of the fauna and flora of the Atlantic Forest. The results of these surveys show the rich biodiversity of the reserve. [22]

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[21] Available at: https://www.biotaxa.org/cl/article/view/12.6.2020
[22] Available at: https://legadodasaguas.com.br/pesquisas/

In this sense, the vascular flora of Legado presents approximately 768 plant species, representing 131 families and 432 genera, of which 619 are angiosperms, 2 gymnosperms and 147 ferns and lycophytes (Colleta et al., 2016)[23]. Of the 106 angiosperm families, the following 10 families represented 48% of the total species sampled: Rubiaceae (47 species), Fabaceae (41 species), Orchidaceae (36 species), Asteraceae (31 species), Melastomataceae (30 species), Myrtaceae (29 species), Poaceae (26 species), Lauraceae (21 species), Piperaceae (21 species) and Cyperaceae (19 species). With 15 species each, Piper (Piperaceae) and Psychotria (Rubiaceae) were the richest genera, followed by Miconia (Melastomataceae) with ten species; Begonia (Begoniaceae) with nine species and Ocotea (Lauraceae) and Eugenia (Myrtaceae) with eight species each.

Of the identified species, according to Colleta et al., 2016, we list below those threatened according to the MMA, 2022[24]. It is important to remember that this list can increase, according to the greater number of studies in the Project Area.

Table 11. Endangered plant species in Legado das Águas.

Scientific name	Family	Degree of threat (MMA, 2022)
Araucaria angustifolia (Bertol.) Kuntze	Araucariaceae	EN
Euterpe edulis Mart.	Arecaceae	VU
Begonia coccinea Hook.	Begoniaceae	EN
Apuleia leiocarpa (Vogel) J.F.Macbr.	Fabaceae	VU
Cedrela odorata L.	Meliaceae	VU
Virola bicuhyba (Schott ex Spreng.) Warb.	Myristicaceae	EN
Eugenia malacantha D.Legrand	Myrtaceae	VU
Asplenium bradeanum Handro	Aspleniaceae	EN

The species *Euterpe edulis*, although threatened, is found in abundance in Legado, due to its restricted access, which leads to virtually no exploitation of these palm trees. This report is yet another indication of the high level of preservation of the Legado.

Regarding orchids, 233 species were identified, with emphasis on *Lepanthopsis legadensis*, a new species discovered in the reserve area, and *Octomeria estrellensis*, considered extinct in nature by the official list of Flora Species Threatened with Extinction in the State of São Paulo[25] and rediscovery in the Legado das Águas area.

Legado das Águas, mostly composed of forest formation, presents pasture and small areas occupied by silviculture. The surroundings of the property, for the most part, are occupied by forest formation and agricultural activities to the south and southwest, and the north and northwest portion features silviculture activities, with a focus on the cultivation of the genus *Eucalyptus*.

The high degree of vegetation could be proven through photos and other information contained in the study by Colleta et al, 2016.

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[23] Available at: https://www.biotaxa.org/cl/article/view/12.6.2020
[24] Available at: https://www.in.gov.br/en/web/dou/-/portaria-mma-n-148-de-7-de-junho-de-2022-406272733
[25] Available at: https://www.infraestruturameioambiente.sp.gov.br/institutodebotanica/wp-content/uploads/sites/235/2016/06/Resolucao-SMA-057-05_2016.pdf

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The results of the research mentioned above also show the biodiversity of the reserve with records of more than 800 species of fauna.[26]

With regards to the invertebrate fauna, a generally little-known group, the list of butterflies includes records of *Godartiana byses*, an extremely rare species that has never been seen in the State of São Paulo, and *Prepona deiphile deiphile*, a very rare species that has only been seen twice in the State of São Paulo in the 1950s and 2000s, attesting to the degree of conservation of the Legado das Águas forest and its importance for the protection of biodiversity.

Among the vertebrate fauna, the target group of the Carbonflor Methodology, the class of mammals presents records of the occurrence of small, medium and large species, such as the jaguar (*Panthera onca*), puma (*Puma concolor*), bush dog (*Speothos venaticus*), white-lipped peccary (*Tayassu pecari*) and tapir (*Tapirus terrestris*), the latter of which stands out in the record of the first two albino individuals in the wild. Another highlight in the group of mammals is the presence of the 3rd largest population group of southern muriquis (*Brachyteles arachnoides*), a critically endangered species, which makes Legado das Águas an area recognized by the IUCN as a priority for the conservation of the largest primate of the Americas.

In bird cataloging studies, the Reserva showed a wide diversity of species, with endemic species and endangered species, especially the anambezinho (*Lodopleura pipra*) and the jacutinga (*Aburria jacutinga*)[27].

Among amphibians, studies carried out in the area point to a significant diversity of anurans, with about 44 species, 37 of which are endemic[28]. The reptiles add up to a total of 23 species, including snakes, lizards, and tortoises. It is worth noting that the species *Hydromedusa maximiliani*, popularly known as the snake-necked turtle and considered one of the smallest freshwater turtles in Brazil, has records in the Legado das Águas area, adding to the list of reptiles one more endemic and endangered species. Furthermore, another species that has the reserve as an area of occurrence is the snake *Corallus cropanii*, known as Jiboia-do-Ribeira, which was described based on a specimen collected in Miracatu.[29]-[30]

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[26] Available at: https://legadodasaguas.com.br/pesquisas/

[27] Available at: https://legadodasaguas.com.br/pesquisas/

[28] Lucas, Marcelo SB, and Giulianna R. Carmassi. "Anuran diversity and conservation at Legado das Águas-Reserva Votorantim, Tapiraí–SP." *Estes Anais trazem os resumos dos trabalhos*. Available at: https://www.ppgcfau.ufscar.br/pt-br/assets/arquivos/workshop/anais-do-workshop-do-ppgcfau/anais-do-iv-workshop-do-ppgcfau-2016#page=22

[29] Gennari, Daniela, and Rocha, B. 2020 'Environmental education in the conservation of the rarest Boidae in the world, the jiboia-do-ribeira' - *Corallus Cropanii* (HOGE,1953). Herpetologia Brasileira, vol. 9 n° 2. Available at: http://public.sbherpetologia.org.br/assets/revista/hb9-2.pdf

[30] Available at: https://bibliotecadigital.butantan.gov.br/edicao/memorias-do-instituto-butantan-vol-25-n-1-1953/35

Table 12. Vertebrate species with occurrence in the Project Area and national (MMA) and global (IUCN) threat status.

Scientific name	Common name	Degree of threat	
		IUN	MMA
Hydromedusa maximiliani	Snake-necked turtle	VU	-
Corallus cropanii	Jiboia-do-Ribeira	EN	VU
Speothos venaticus	Bush dog	-	VU
Herpailurus yagouaroundi	Jaguarundi	-	VU
Leopardus tigrinus	Gato-do-mato	VU	EN
Leopardus wiedii	Gato maracajá	-	VU
Tayassu pecari	White-lipped peccary	VU	VU
Myrmecophaga tridactyla	Tamanduá-bandeira	VU	VU
Brachyteles arachnoides	Southern muriquis	CR	EN
Sylvilagus brasiliensis	Tapiti	EN	-
Tapirus terrestris	Tapir	VU	VU
Amadonastur lacernulatus	Gavião-pombo-pequeno	-	VU
Aburria jacutinga	Jacutinga	-	EN
Platyrinchus leucoryphus	Patinho-de-asa-castanha	VU	VU
Touit melanonotus	Apuim-de-costas-pretas	-	VU
Myrmotherula minor	Choquinha-pequena	VU	VU
Biatas nigropectus	Papo-branco	VU	-
Sporophila frontalis	Pixoxó	VU	VU
Sporophila falcirostris	Cigarra	VU	VU
Laniisoma elegans	Chibante	-	EN
Iodopleura pipra	Anambezinho	EN	EN
Onychorhynchus swainsoni	Maria-leque-do-sudeste	VU	VU

VU: Vulnerable; **EN**: Endangered; **CR**: Critically endangered.

The table above gathers the species with registered occurrence for the Project Area that present some degree of threat. The history of high rigor and effort to conserve the area by the owner favors the occurrence and use of the Legado das Águas area by species from different taxonomic groups, indicating, through the fauna, a balanced ecosystem. The monitoring carried out with the feline species and through the trap cameras provide us with evidence of well-established populations in the area for Tapirs, Pumas, Jaguars and several other species, such as the southern Muriquis, a critically endangered species. Thus, it was possible to verify a high richness, diversity, and abundance in the species, through the information given and disclosed by the owner.

1.10.5. DEVELOPED ACTIVITIES

Legado das Águas is a reserve open to the public, providing contact with the community through environmental education, handicrafts, and other activities. In addition, the reserve works as a natural shield for the water resources sheltered within the reserve, and has infrastructure to offer ecotourism with trails, water rides, lookouts, and canoeing. And the area also has an inn and camping area.

Because it harbors great biodiversity typical of the Atlantic Forest biome, Legado das Águas has actions aimed at the production of native species in nurseries, at the Biodiversity Center, and focused on scientific research of local fauna and flora. Contemplating from studies of identification, distribution, and occupation of species to

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the improvement of techniques for growing of native plants, diagnoses of the epidemiological scenario of the forest, development of new products and services, among others.

The Atlantic Forest Biodiversity Center is responsible for mapping the flora species of the Legado das Águas and has two nurseries, where it produces plants native to the biome for reforestation and landscaping projects, with a production capacity of 200,000 seedlings per year, ranging more than 80 different native species.

Furthermore, inside the Legado das Águas there are dams along the Juquiá River with 5 (five) Hydroelectric Power Plants ("UHE"), namely: (i) UHE Serraria, in Juquiá, with an installed capacity of 24MW; (ii) UHE Alecrim, in Juquiá, with an installed capacity of 72 MW; (iii) UHE Porto Raso, in Tapiraí, with an installed capacity of 28.4 MW; (iv) UHE Barra, in Tapiraí, with an installed capacity of 40.4 MW; and (v) UHE Fumaça, in Ibiúna, with an installed capacity of 36.4MW.

It is worth noting that Legado das Águas is in the region with the lowest HDI in the State of São Paulo, which has serious consequences for the region and society. With that in mind, one of the Reserva's main objectives is to catalyze socioeconomic initiatives, thus contributing to the sustainable development of the municipalities it forms part of, seeing this as a prerequisite for running its activities. Therefore, in 2012, several diagnostic studies were carried out with the aim of developing the locations included in the area in order to integrate the community with the project, enabling the definition of priority work fronts, which aim to: (i) foster the economic activities of socio-environmental development; (ii) strengthen the offer of infrastructure and public services; and (iii) to integrate Legado das Águas with the local and surrounding communities so that there is a natural incorporation of Legado into their routines. [31]

Thus, Legado das Águas seeks to get involved in a sustainable way in the community in which it operates, investing and acting in projects with a positive social impact. Also counting on the support from Instituto Votorantim, the Reserva's Social Action program covers five investment axes (i) ReDes Program, which encourages sustainable development, providing technical and financial support for strengthening inclusive production chains capable of generating income; (ii) Support for Public Management (SPM), which expands the capacities of the municipal public power, strengthening its role as an agent of local development; (iii) Partnership for the Valorization of Education (PVE), which contributes to the improvement of public education in the municipalities where Legado das Águas is located and operates in partnership with city halls and municipal education departments; (iv) Engagement of people and local and regional institutions, seeking to establish partnerships with new institutions and strengthen existing ones, to enhance actions and positively impact the largest number of people; and (v) Integration and engagement with employees and the internal community of Legado das Águas: involves the team in the construction of social planning, promotes engagement actions with different themes and internally disseminates the performance of initiatives in the area. [32]

In this way, it is emphasized that the role of the Legado goes beyond environmental issues, promoting social and economic benefits for the region through the sustainable use of natural resources, generating income while favoring the maintenance of cultural heritage and traditional practices. An important example of these actions can be observed in the case of the traditional community of Ribeirão da Anta. This community

[31] Social Report – Legado das Águas (2012 – 2015). Available at:
https://legadodasaguas.com.br/legado/wp-content/uploads/2021/08/af_relatoriola2015port_p28-29.pdf
[32] Available at: https://legadodasaguas.com.br/desenvolvimento-territorial/

is located within the limits of the Legado area, in the municipality of Tapiraí-SP, and it is a region that protects abundant culture in an area surrounded by the Atlantic Forest, with waterfalls and exuberant flora and fauna. [33]

In this context, Legado das Águas comes to recognize and empower the community to preserve its history, adding value and contributing to its development. In 2016, for example, an area was recovered in order to restore access to water to community residents. In addition, with a partnership with the municipality, the old school building in the region was renovated, the community Traditions Center was reconstructed and entrepreneurship activities were carried out for the residents of Ribeirão da Anta with the launch, in 2017, of the book Ribeirão da Anta, telling its story and, since then, the community has been open for visitation, and a service and development contract has been signed with the community.[34]

Also noteworthy are the actions promoted by the SPM, in which, among other activities, it supported the completion of the Regional Integrated Tourism Plan for the municipalities of Juquiá, Miracatu and Tapiraí, enabling the structuring of municipalities to obtain state resources with the aim of investing in tourism and generating activity in the local economy through its placement as a Municipality of Tourist Interest (MTI).

Furthermore, in 2020 and 2021, at the height of the COVID-19 pandemic, emergency actions were carried out, with the donation of food tickets to 956 families for 5 months and the donation of 120 thousand PPE's, both actions for the municipalities of Miracatu, Tapiraí and Juquiá, in addition to the donation of hospital equipment to the municipality of Registro and Miracatu, remote ICU tool for Registro and telemedicine for Miracatu, all adding up to around 1 million Reais in investments. [35]

These were some of the main actions promoted by Legado, and in Table 13 it is possible to observe the timeline with a summary of the initiatives of the Socio-environmental Action Program of the Reserva carried out in the territory and surroundings of Legado das Águas.

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[33] Available at: https://legadodasaguas.com.br/ribeirao-da-anta/
[34] Available at: https://legadodasaguas.com.br/ribeirao-da-anta/
[35] Available at: https://legadodasaguas.com.br/desenvolvimento-territorial/

Table 13. Initiatives carried out in the territory of Legado das Águas.

Initiative	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Socioeconomic Diagnosis of Juquiá, Miracatu and Tapiraí	■	■										
Participatory Rural Diagnosis of Juquiá and Tapiraí		■	■									
Engaja Program			■									
Challenges and benefits of basic sanitation in municipalities of Vale do Ribeira			■									
Diagnosis of rural development around the Legado			■									
Public Management Support Program (SPM) of Juquiá, Miracatu and Tapiraí			■									
Support Consultancy for Juquiá and Tapiraí			■	■	■	■						
Transportando o Futuro Project - Tapiraí				■	■							
Empreende Program - Tapiraí				■	■	■						
ReDes Program - Juquiá				■	■	■	■	■	■	■		
Partnership for the Valorization of Education (PVE) - Juquiá (in progress)				■	■	■	■	■	■	■	■	
Voluntary Challenge - EMEIEF - Bairro Serraria, Juquiá					■	■						
Community Participation - Juquiá, Tapiraí and Miracatu						■	■					
Voluntary Challenge - EMEIEF - Alvorada, Miracatu						■	■					
ReDes Program - ARCPHPN - Tapiraí						■	■	■	■	■		
SPM of Juquiá, Miracatu and Tapiraí							■	■				
Support for Juquiá and Miracatu							■	■				
Voluntary Challenge - Lar dos Idosos, Miracatu							■	■				
360º Project - Juquiá and Miracatu							■	■	■	■		
SPM Health - Juquiá, Miracatu and Tapiraí								■	■			
Voluntary Challenge - EMR Verenanda Augusta Bertanha Soares, Juquiá								■	■			
Brazilian Culture Tours - Vale do Ribeira								■	■	■		
Assistance in combating COVID-19 - Juquiá, Miracatu, Tapiraí and Registro								■	■	■		
Continued training of physical education teachers - Vale do Ribeira								■	■	■		
Local Supplier Support - Vale do Ribeira								■	■	■	■	

Initiative	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Training of cultural agents - Miracatu								█	█	█		
Portas Abertas Program - Vale do Ribeira (in progress)								█	█	█	█	█
SPM Economic Resumption - Tapiraí									█	█		
A cidade da gente Project - Juquiá, Miracatu and Tapiraí									█	█		
Cine Solar - Vale do Ribeira									█			
Serras Circuit - Miracatu									█			
Voluntary Challenge - Tapiraí Social assistance									█			
SPM Health - Tapiraí									█	█	█	
Legado dos Pássaros Project - Tapiraí										█		
Neo Running - Tapiraí										█		
Cine Autorama - Juquiá, Miracatu, Tapiraí, Registro, Piedade and Ibiúna										█		
Voluntary Challenge - Juquiá Educational and social support center - CAES										█		
Viver melhor Project - Juquiá										█		
Esporte e cidadania Project - Juquitiba										█		
Child Nature										█		
Buzum Project										█		
Partnership for the Valorization of Education (PVE) - Registro										█		
Viver melhor Project - Juquiá (in progress)										█	█	
Diverte Teatro Viajante Project - Vale do Ribeira (in progress)										█	█	
Buzum Project - Vale do Ribeira (in progress)										█	█	
Sabiá Laranjeira Project - Miracatu (in progress)										█	█	
Corrida pela diversidade Project - Juquiá (in progress)										█	█	
Esporte e cidadania Project - Juquitiba (in progress)										█	█	█

Source: Territorial Development – Legado das Águas.[36]

[36] Available at: https://legadodasaguas.com.br/desenvolvimento-territorial/

1.10.6. PROVIDED ENVIRONMENTAL SERVICES

As explained in the previous items characterizing the Project Area, Legado das Águas is a provider of several Ecosystem Services and, with the activities carried out on the property, Reservas Votorantim encourages the growth of such EcS through the Environmental Services provided by the entity and team responsible for this reservation.

As determined by the PES Law, Environmental Services are "individual or collective activities that favor the maintenance, recovery or improvement of ecosystem services". Thus, we can list several efforts by Reservas Votorantim as an EnS provider:

   i.   As it is a property managed by Reservas Votorantim with the purpose of conservation and sustainable use, Legado das Águas has a team to manage and protect the reserve. Therefore, the **monitoring** of local pressures, disturbances, and conservation itself is a provided EnS, promoting EcS within the scope of regulation.
   ii. By investing in environmental education and in its own research center, the reserve offers **support to society** through the dissemination of knowledge and environmental awareness.
   iii. By conserving a large reserve of Atlantic Forest and producing native plant species, the Legado area makes a positive contribution to **supporting the conservation of biodiversity and the provision and supply of water** to society, with these EnS maintaining, recovering, and improving the EcS of provision and support.

1.11. ECOSYSTEM SERVICES

As determined by the Methodology, there are several methods of classifying Ecosystem Services. Brazilian legislation separates EcS into provisioning services, support services, regulatory services and cultural services (Table 14). Another classification method was established by the Common International Classification of Ecosystem Services (CICES), which organizes EcS into three main categories: provisioning services, regulation and maintenance services, and cultural services (Table 15).

Thus, this report will consider these two classifications for the application of the Methodology in the Legado das Águas Project Area, as shown in Table 14 and Table 15.

Table 14. Ecosystem Services according to Law No. 14,119, of January 13, 2021, which institutes the National Policy for Payment for Environmental Services.

Section	Definition	EcS description
Provision	Services that provide environmental goods or products used by humans for consumption or trading.	Water, food, wood, fibers and extracts, among others.
Support	Services that maintain the longevity of life on Earth.	Nutrient cycling, residue decomposition, production, maintenance or renewal of soil fertility, pollination, seed dispersal, control of populations of potential pests and potential vectors of human diseases, protection against ultraviolet solar radiation

Section	Definition	EcS description
		and maintenance of biodiversity and the genetic heritage
Regulation	Services that contribute to maintaining the stability of ecosystem processes	Carbon sequestration, air purification, moderation of extreme weather events, maintenance of hydrological cycle balance, minimization of floods and droughts, and control of critical processes of erosion and landslides
Cultural	Services that constitute non-material benefits provided by ecosystems	Recreation, tourism, cultural identity, spiritual and aesthetic experiences, and intellectual development, among others

Table 15. Classification of Ecosystem Services according to the Common International Classification of Ecosystem Services (CICES).

Section	Division	Group	Class	EcS Description
Regulation	Regulation of physical, chemical, biological conditions	Regulation of baseline flows and extreme events	Control of erosion rates	Controlling or preventing soil loss
			Buffering and attenuation of mass movement	Stopping landslides and avalanches harming people
			Hydrological cycle and water flow regulation (Including flood control, and coastal protection)	Regulating the flows of water in our environment
		Lifecycle maintenance, habitat and gene pool protection	Pollination (or 'gamete' dispersal in a marine context)	Pollinating our fruit trees and other plants
			Seed dispersal	Spreading the seeds of wild plants
			Maintaining nursery populations and habitats (Including gene pool protection)	Providing habitats for wild plants and animals that can be useful to us
		Regulation of soil quality	Weathering processes and their effect on soil quality	Ensuring soils form and develop
			Decomposition and fixing processes and their effect on soil quality	Ensuring the organic matter in our soils is maintained
		Atmospheric composition and conditions	Regulation of chemical composition of atmosphere and oceans	Regulating our global climate
			Regulation of temperature and humidity, including ventilation and transpiration	Regulating the physical quality of air for people
Provision	Water	Surface water used for	Surface water for drinking	Drinking water from sources at the ground surface

Section	Division	Group	Class	EcS Description
		nutrition, materials or energy	Surface water used as a material (non-drinking purposes)	Surface water that we can use for things other than drinking
			Freshwater surface water used as an energy source	Hydropower

1.12. SELECTED ECOSYSTEM INDICATORS

According to the determinations of the Methodology, the following indicators were selected for the Legado das Águas.

Table 16. Selected ecosystem indicators.

Indicators	Included?	Mandatory?	Justification
Stored Carbon	Yes	Yes	Mandatory indicator and used as a conversion metric for the measurement of Ecosystem Services in the Legado das Águas and as a precursor of EcS.
Land Use and Land Cover – Native Vegetation Cover	Yes	Yes	Mandatory indicator used in the analysis and understanding of the environment of provision of EcS and the fragmentation of the ecosystem.
Proportionality	Yes	No	Indicator not mandatory and included due to the significance of the size of the vegetation fragments included in the Project Area and Area of Influence.
Conservation of APP	Yes	Yes	Mandatory indicator and included due to the importance of the conservation of PPAs in a highly irrigated Project Area.
Density of Springs	Yes	No	Indicator not mandatory but included due to the high incidence of springs in the Project Area and its surroundings.
Biodiversity	Yes	Yes	Mandatory indicator and used to measure the diversity of fauna and flora provided by the conserved ecosystem in the Legado das Águas.
Land Use and Land Cover – Native Vegetation Cover beyond the Legal Requirement	No	No	Indicator not included due to the exclusionary criterion determined in the Methodology.
Connectivity	No	No	Indicator not included due to the non-applicability of the indicator in relation to the Project Area.
Surface water quality	No	No	Indicator not included due to the choice of the proponent in relation to the feasibility of the project.

This report emphasizes that it is in line with the Methodology, since it contemplates the mandatory indicators, as well as extrapolating the minimum number of indicators (five), according to the table above.

The indicators will be properly monitored in their respective items.

1.13. MONITORING PLAN

The Monitoring Plan follows the guidelines of the Carbonflor Methodology and aims to verify the EnS provided by Reservas Votorantim through the evaluation of the Ecosystem Indicators selected in the AR and developed and evaluated in the MR, during the Valuation Period in the Project Area. According to the determinations of the Methodology, the specifications of the Monitoring Plan are described below.

The table below presents the monitoring modules selected for the realization of the PSA Carbonflor in the Legado das Águas.

Table 17. Monitoring Plan.

Monitoring	Activity	Method	Periodicity	Responsible	Report
PES Project Monitoring	Surveillance and Verification	Visual, patrol, reports	Constant	Reservas Votorantim	MR
Vegetation cover monitoring	Vigilance	SR, reports, patrol	Annual	ECCON*	
Loss Risk Monitoring	Surveillance	Official fire and deforestation database, SR	Annual	ECCON*	
Monitoring of changes in Ecosystem Indicators	Verification of the obtained values	Re-evaluation of Indicators	2 years	ECCON*	
Safety Reserve	Surveillance and Verification	SR, reports, patrol	Annual	ECCON*	

*Reports of all kinds from Reservas Votorantim must be constant to ECCON to support remote monitoring, as changes occur in the Project Area.

Description of the activities carried out in this first monitoring period:

- **PES Project Monitoring:** Continuous monitoring by Reservas Votorantim of the internal processes and operations of management of the Legado das Águas. Prevention and reporting of deforestation events or other occurrences found by the team *on site* (see item 1.13.1.1) to the management team of PSA Carbonflor, for proper records and methodological calculations.
- **Monitoring of vegetation cover**: Annual monitoring through remote sensing techniques, to verify changes in vegetation cover in the Project Area.
- **Risk of Loss Monitoring:** Annual monitoring through remote sensing, and official databases to ascertain possible environmental disturbances such as fire, degradation, deforestation and other disturbances that may cause Risk of Losses.
- **Monitoring of changes in Ecosystem Indicators**: As described in section 5.2 of the Methodology, indicators are selected and responsible for characterizing and assigning value to the EcS generated in the Project Area.
  Each indicator will be developed and will have its score assigned in the section corresponding to each MR issuance.

1.13.1. MONITORING METHODS

According to the guidance of the Methodology, for this Project Area, which is a protected area with public commitment to conservation, in a successional stage of advanced forest cover, the EnS monitoring methods selected were (i) Monitoring Agent, (ii) Remote Sensing and (iii) Demonstration of Non-Decrease, as shown in the following sub-items.

1.13.1.1. MONITORING AGENT

As foreseen in the Methodology, the PSA Carbonflor for the Legado das Águas will have the figure of the Monitoring Agent. This will be a local and familiar contact with the Project Area to support the reporting of daily information regarding the development of the project and any factor that may influence the PES.

The annual reporting of information is foreseen through a checklist prepared by the proponent.

For the Legado das Águas, the role of the Monitoring Agent will be played by a team of professionals linked to the daily life of the Legado das Águas and Reservas Votorantim, as shown in the table below.

Table 18. Monitoring Agents - Legado das Águas.

Monitoring Agent	Monitoring Focus	Contact Details
Mayara Neme Mira	Property	e-mail: mayara.mira@reservasvotorantim.com.br
Marcello Leonardo Pimentel	Monitoring system management	e-mail: marcello.pimentel@reservasvotorantim.com.br Phone: +55 (11) 91620-8967
Daniela Gerdenits	Biodiversity	e-mail: DANIELA.GERDENITS@legadodasaguas.com.br Phone: +55 (13) 99206-3878

1.13.1.2. REMOTE SENSING

Through Geographic Information Systems (GIS), remote sensing techniques are used for the purpose of surveillance and monitoring of the Project Area. The analyses used to monitor vegetation cover, land use and Risk of Loss should be carried out seasonally, one in the first semester, another in the second semester and, optionally, a third.

The use of satellite images with a resolution of 30 meters (Landsat), or higher, up to 2 meters (CBERS4A), will be used to allow specific analysis and calculations in fire events, modification of land uses, unscheduled suppressions of vegetation and identification of deforested areas. In addition, secondary data from projects made available by official bodies and/or recognized to produce quality data, such as INPE, IBGE, MapBiomas, TerraBrasilis and BD Queimadas, are used for better matching and detection of events that may occur in the area.

1.13.1.3. DEMONSTRATION OF NON-DECREASE METHOD

This method was selected for the Legado das Águas Project Area following the parameters indicated by the Methodology, since: (i) there was no logging in the Project Area in the last 10 years; (ii) the Project Area has not been affected by any disturbance (e.g., pest, fire) that could jeopardize the environmental services provided; and (iii) there was no change in vegetation cover in the Project Area.

Considering the proof, through the monitoring methods presented above, and in the maps presented in the following sections, of the vegetation cover in an advanced state of ecological succession and the high degree of conservation of the Project Area, this method is adequate for monitoring the Legado Project Area.

2. MONITORING REPORT

2.1. MONITORING PERIOD

The monitoring period analyzed in this report is from December 2017 to May 2023.

2.2. VERIFICATION OF ECOSYSTEM INDICATORS

In this item the measurements related to the Ecosystem Indicators selected in item 1.12 that assign value to the EcS found in the Project Area will be presented.

2.2.1. STORED CARBON

Stored Carbon, besides being a mandatory Ecosystem Indicator in the PSA Carbonflor Methodology, has great relevance in the analysis of Ecosystem Services provided by nature. Thus, the area of the Legado das Águas, object of this report, has great importance in the conservation of native vegetation, in the provision of water and acts as an important pool of Stored Carbon.

The Methodology for carbon quantification used in this report is described below.

Regarding the EcS associated with this indicator, they can be related according to the following tables.

Table 19. EcS related to the Stored Carbon indicator, according to PES Law.

Section	Definition	Description of the EcS
Regulation	Services that contribute to the maintenance of the stability of ecosystem processes	Carbon sequestration, air purification, moderation of extreme weather events, maintenance of the balance of the hydrological cycle, minimization of floods and droughts and control of critical erosion and slope slide processes

Table 20. EcS related to the Stored Carbon indicator, according to CICES.

Section	Division	Group	Class	Description of the SE
Regulation	Regulation of physical, chemical and biological conditions	Composition and atmospheric conditions	Regulation of the chemical composition of the atmosphere and oceans	**Global climate regulation (carbon sequestration)**
			Regulation of temperature and humidity, including ventilation and perspiration	Regulation of physical air quality for humanity

2.2.1.1. CARBON POOLS

For the application of the Methodology and calculation of the carbon stock in the PSA Carbonflor, the carbon pools as described in the table below will be considered at the beginning of the project. All the pools presented in the Methodology were considered in this report due to the importance of evaluating the stock present throughout the ecosystem, especially in areas in an advanced stage of succession, as is the case of the Legado das Águas, demonstrating the importance and function of conserved areas of the Atlantic Forest biome.

Table 21. Carbon pools considered in the monitoring.

Carbon Pool	Included/ Excluded	Justification
Above-ground biomass	Included	Mandatory pool with high carbon content accumulated in the aerial part of the vegetation.
Below-ground biomass	Included	Mandatory pool with importance in the totality of the Carbon stored in the arboreal vegetation.
Litter	Included	In conserved areas where biomass is not exported, litter is an important source of stored carbon.
Dead wood	Included	This pool, as well as the litter, helps in understanding the forest dynamics of conserved areas and should be accounted for in the analysis of the total stock.
Soil	Included	Pool considered stable under native and conserved forest cover, demonstrating the importance of these areas also in soil health.

2.2.1.2. CARBON STOCK ESTIMATION

For the analysis of the Stored Carbon, the instructions contained in the PSA Carbonflor Methodology were met in their entirety, aiming at the best estimate in terms of data reliability and resource optimization. Thus, the description of the procedures used in the estimation of the Stored Carbon indicator is presented below.

2.2.1.2.1. BIOMASS DATA COLLECTION

To estimate the Stored Carbon in the Legado das Águas, the data on carbon stock was obtained from a secondary database. The source chosen and recognized nationally and internationally was the Fourth National Communication of Brazil to UFCCC, whose inventory of emissions and removals of greenhouse gases comprises a wide range of scientific studies in the different biomes and their respective phytophysiognomies. The

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data are public and corresponds to the carbon stock in the different pools, which are considered in the PSA Carbonflor Methodology, so the carbon stock was acquired directly, without the use of conversion factors.

2.2.1.3. CARBON STOCK ESTIMATION – TREE ($C_{\text{Tree},t}$), DEAD WOOD ($C_{DW,t}$) AND LITTER ($C_{Li,t}$)

Because we deal with secondary data of national scope, we stratified the data in order to be more faithful to the differences of the vegetation, considering each phytophysiognomy found in the area as a stratum. In total, 2 phytophysiognomies were identified, Dense Ombrophilous Montane Forest and Dense Ombrophilous Submontane Forest, both characteristics of the Atlantic Forest (see item 1.10.4).

2.2.1.3.1.1. CARBON INCREMENT ESTIMATION

Based on the study of forest growth widely used in the forestry sector, consolidated data were used and provided from the ForestPlots platform[37], whose database consists of robust information from censuses conducted in the region of the Project Area, for 33 years, for the estimation of carbon increment in the vegetation.

Carbon gains (tC ha⁻¹ year⁻¹) were estimated as the sum of the growth of the surviving trees (Above Ground Carbon(AGC) of the tree at the end of the interval minus the AGC of the tree at the beginning of the interval) plus the sum of the AGC of the considered trees (individuals of trees or stems that reached Diameter at Breat Height - DBH ≥ 5 cm at the end of the interval, assuming DBH = 0 at the beginning of the interval). The sum of the growth of the survivors with the AGC of the considered trees was divided by the length of the interval (in years) and then scaled to hectares. Carbon losses (tC ha⁻¹ year⁻¹) were estimated as the sum of the AGC of individuals and stems that died during a census interval, divided by the duration of the census interval (in years), and then scaled to hectares. The net carbon increment (tC ha⁻¹ year⁻¹) was calculated to be carbon gains minus carbon losses.

Thus, it is assumed that the average annual periodic increase of carbon in the region is in the order of 0.23 tC ha⁻¹ year⁻¹. This value is considered as the carbon gain elapsed in one year in the areas of protected native vegetation in the project and will be added to the average stock.

2.2.1.4. SOIL ORGANIC CARBON STOCK ESTIMATE ($C_{SOC,t}$)

The calculation of soil carbon stocks (SOC) of the Native Vegetation Area was made using secondary data. The PSA Carbonflor Methodology uses premises proposed by the study by Bernoux *et al* (2002)[38], the main reference provided by the Fourth National Communication of Brazil to the UNFCCC[39].

Bernoux's study estimates soil organic carbon at a depth of up to 30 cm based on "soil-vegetation associations" (SVA). The SVA is generated from an intersection between polygons (or map unit - "UM") of soils and vegetation. A simplified soil classification is

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[37] Available at: www.forestplots.net
[38] Bernoux, M. et al. Brazil's soil carbon stocks. Soil Science Society of America Journal, v. 66, p. 888-896, 2002.
[39] Available at <https://www.gov.br/mcti/pt-br/acompanhe-o-mcti/noticias/2020/10/4a-comunicacao-nacional-do-brasil-a-convencao-do-clima-das-nacoes-unidas-fortalece-articulacao-institucional> Accessed on Jan. 14th, 2022.

used for the formation of UM considering the following attributes: texture, degree of saturation by bases and humidity[40].

Subsequently, the study adopts the following steps to estimate soil carbon stocks:

i. Elaboration of an SVA map;
ii. Organization of data on soil class, carbon concentration, density and native vegetation;
iii. Calculation of representative carbon stocks ("RCS") for each SVA.

The Fourth National Communication of Brazil to the UNFCCC adopts this study as a reference and presents values of the carbon stock in the soils by soil-vegetation association. To ensure the most assertive and current classifications, the BDIA database was used to classify the soil and vegetation, as can be seen in Figure 18.

Originally, the proposal of the IPCC/UNEP/OECD/IEA (1997) generated six groups of soils that considered the clay activity according to the definitions of the SiBCS (Brazilian Soil Classification System). Thus, the soil and vegetation groups for the formulation of SVA in the Legado das Águas area were based on the types suggested by Bernoux et al (2002),

As shown in the following figure, the classes (i) cambisols with mostly low activity clay, and(ii) red-yellow argisols, are situated within the boundaries of the Legado das Águas, and these types of soil correspond to the group of "non-latosols with low-activity clay", i.e. category S3, being appropriate, then, to use Bernoux's base study. As for vegetation, the entire Project Area corresponds to the "Atlantic Forest" class, which is the appropriate definition for inclusion in the base study (see more information on vegetation in item 1.10.4), which corresponds to category V3.

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[40] As suggested by the IPCC/UNEP/OECD/IEA (1997).

Figure 18. Indication of the soil and vegetation classes of the Project Area.
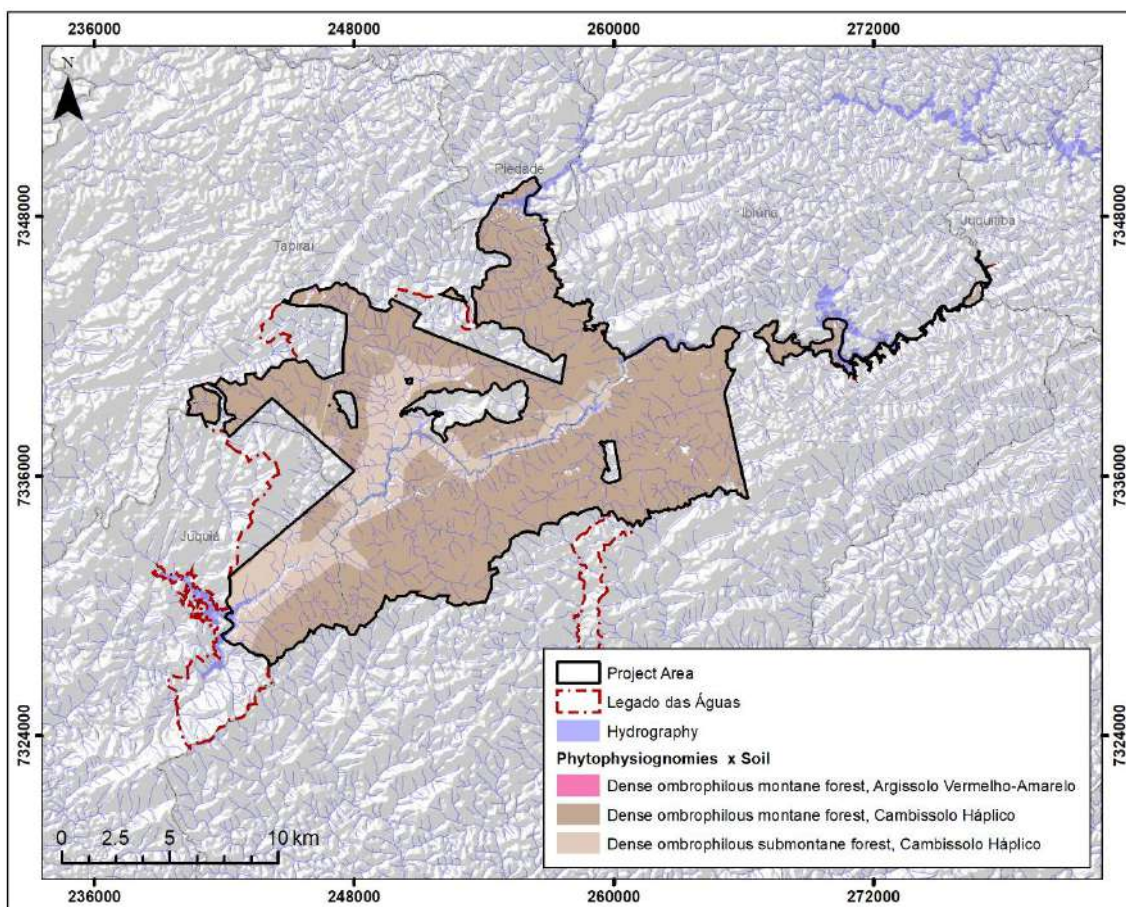
Source: IBGE/BDIA.

Thus, the SVA class for the soil and vegetation characteristics of the Project Area has a representative carbon stock equal to **42.9 t C/ha** estimated for the limit of the Project Area.

2.2.1.4.1. SUMMARY OF CARBON STOCK ESTIMATES

To estimate the equivalent carbon stock present in the Legado das Águas area according to the PSA Carbonflor Methodology, the total carbon content was multiplied by 3.6667 (44/12)[41], the default value for the conversion. The estimated average values of CO2e in the Project Area can be seen in the following table.

Table 22. Estimation of carbon stock by phytophysiognomy in the Project Area.

Year	Dense Ombrophilous Montane Forest Carbon Stock (tC)	Dense Ombrophilous Submontane Forest Carbon Stock (tC)	Total accumulated C stock (tC)	Total accumulated CO2e stock (tCO2e)
Dec/17	4,086,527	815,326	4,901,852	17,973,458
2018	4,090,629	816,152	4,906,782	17,991,533

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[41] Ratio of the mass of CO2 = 44 to the mass of C = 12; 44/12 = 3.66667

Year	Dense Ombrophilous Montane Forest Carbon Stock (tC)	Dense Ombrophilous Submontane Forest Carbon Stock (tC)	Total accumulated C stock (tC)	Total accumulated CO2e stock (tCO2e)
2019	4,094,732	816,979	4,911,711	18,009,608
2020	4,098,835	817,806	4,916,641	18,027,682
2021	4,102,938	818,632	4,921,570	18,045,757
2022	4,107,040	819,459	4,926,500	18,063,832
2023	4,111,143	820,286	4,931,429	18,081,907
2024	4,115,246	821,113	4,936,359	18,099,982
2025	4,119,349	821,939	4,941,288	18,118,057
2026	4,123,452	822,766	4,946,218	18,136,132
2027	4,127,554	823,593	4,951,147	18,154,206
2028	4,131,657	824,420	4,956,077	18,172,281
2029	4,135,760	825,246	4,961,006	18,190,356
2030	4,139,863	826,073	4,965,936	18,208,431
2031	4,143,965	826,900	4,970,865	18,226,506
2032	4,148,068	827,726	4,975,795	18,244,581
2033	4,152,171	828,553	4,980,724	18,262,656
2034	4,156,274	829,380	4,985,654	18,280,730
2035	4,160,377	830,207	4,990,583	18,298,805
2036	4,164,479	831,033	4,995,513	18,316,880
2037	4,168,582	831,860	5,000,442	18,334,955
2038	4,172,685	832,687	5,005,372	18,353,030
2039	4,176,788	833,514	5,010,301	18,371,105
2040	4,180,890	834,340	5,015,231	18,389,180
2041	4,184,993	835,167	5,020,160	18,407,254
2042	4,189,096	835,994	5,025,090	18,425,329
2043	4,193,199	836,821	5,030,019	18,443,404
2044	4,197,302	837,647	5,034,949	18,461,479
2045	4,201,404	838,474	5,039,878	18,479,554
2046	4,205,507	839,301	5,044,808	18,497,629
2047	4,209,610	840,127	5,049,737	18,515,704
2048	4,213,713	840,954	5,054,667	18,533,779
2049	4,217,815	841,781	5,059,596	18,551,853
2050	4,221,918	842,608	5,064,526	18,569,928
2051	4,226,021	843,434	5,069,455	18,588,003
2052	4,230,124	844,261	5,074,385	18,606,078
2053	4,234,227	845,088	5,079,314	18,624,153

Year	Dense Ombrophilous Montane Forest Carbon Stock (tC)	Dense Ombrophilous Submontane Forest Carbon Stock (tC)	Total accumulated C stock (tC)	Total accumulated CO2e stock (tCO2e)
2054	4,238,329	845,915	5,084,244	18,642,228
2055	4,242,432	846,741	5,089,173	18,660,303
2056	4,246,535	847,568	5,094,103	18,678,377
2057	4,250,638	848,395	5,099,032	18,696,452
2058	4,254,740	849,222	5,103,962	18,714,527
2059	4,258,843	850,048	5,108,891	18,732,602
2060	4,262,946	850,875	5,113,821	18,750,677
2061	4,267,049	851,702	5,118,750	18,768,752
2062	4,271,152	852,528	5,123,680	18,786,827
2063	4,275,254	853,355	5,128,609	18,804,901
2064	4,279,357	854,182	5,133,539	18,822,976
2065	4,283,460	855,009	5,138,469	18,841,051
2066	4,287,563	855,835	5,143,398	18,859,126
2067	4,291,665	856,662	5,148,328	18,877,201
2068	4,295,768	857,489	5,153,257	18,895,276
2069	4,299,871	858,316	5,158,187	18,913,351
2070	4,303,974	859,142	5,163,116	18,931,425
2071	4,308,076	859,969	5,168,046	18,949,500
2072	4,312,179	860,796	5,172,975	18,967,575
2073	4,316,282	861,623	5,177,905	18,985,650
2074	4,320,385	862,449	5,182,834	19,003,725
2075	4,324,488	863,276	5,187,764	19,021,800
2076	4,328,590	864,103	5,192,693	19,039,875
2077	4,332,693	864,929	5,197,623	19,057,950
2078	4,336,796	865,756	5,202,552	19,076,024
2079	4,340,899	866,583	5,207,482	19,094,099
2080	4,345,001	867,410	5,212,411	19,112,174
2081	4,349,104	868,236	5,217,341	19,130,249
2082	4,353,207	869,063	5,222,270	19,148,324
2083	4,357,310	869,890	5,227,200	19,166,399
2084	4,361,413	870,717	5,232,129	19,184,474
2085	4,365,515	871,543	5,237,059	19,202,548
2086	4,369,618	872,370	5,241,988	19,220,623
2087	4,373,721	873,197	5,246,918	19,238,698
2088	4,377,824	874,024	5,251,847	19,256,773

Year	Dense Ombrophilous Montane Forest Carbon Stock (tC)	Dense Ombrophilous Submontane Forest Carbon Stock (tC)	Total accumulated C stock (tC)	Total accumulated CO2e stock (tCO2e)
2089	4,381,926	874,850	5,256,777	19,274,848
2090	4,386,029	875,677	5,261,706	19,292,923
2091	4,390,132	876,504	5,266,636	19,310,998
2092	4,394,235	877,330	5,271,565	19,329,072
2093	4,398,338	878,157	5,276,495	19,347,147
2094	4,402,440	878,984	5,281,424	19,365,222
2095	4,406,543	879,811	5,286,354	19,383,297
2096	4,410,646	880,637	5,291,283	19,401,372
2097	4,414,749	881,464	5,296,213	19,419,447
2098	4,418,851	882,291	5,301,142	19,437,522
2099	4,422,954	883,118	5,306,072	19,455,597
2100	4,427,057	883,944	5,311,001	19,473,671
2101	4,431,160	884,771	5,315,931	19,491,746
2102	4,435,263	885,598	5,320,860	19,509,821
2103	4,439,365	886,424	5,325,790	19,527,896
2104	4,443,468	887,251	5,330,719	19,545,971
2105	4,447,571	888,078	5,335,649	19,564,046
2106	4,451,674	888,905	5,340,578	19,582,121
2107	4,455,776	889,731	5,345,508	19,600,195
2108	4,459,879	890,558	5,350,437	19,618,270
2109	4,463,982	891,385	5,355,367	19,636,345
2110	4,468,085	892,212	5,360,296	19,654,420
2111	4,472,188	893,038	5,365,226	19,672,495
2112	4,476,290	893,865	5,370,155	19,690,570
2113	4,480,393	894,692	5,375,085	19,708,645
2114	4,484,496	895,519	5,380,014	19,726,719
2115	4,488,599	896,345	5,384,944	19,744,794
2116	4,492,701	897,172	5,389,873	19,762,869
Dec/2117	4,496,557	897,949	5,394,506	**19,779,855**

*The soil emission factor refers to the ratio: SOC stock per ha - Valuation Period (100 years). Conservatively, it is understood that in the case of soils under native and conserved forest cover, the SOC is a stable stock, according to IPCC recommendations and[42] REDD+ methodologies[43] currently in use.

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[42] Available at: http://www.ipccnggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_05_Ch5_Cropland.pdf
[43] Approved VCS Module VMD0004, Version 1.0, REDD - Methodological Module: Estimation of stocks in the soil organic carbon pool (CP-S), Sectoral Scope 14.

2.2.2. FRAGMENTATION OF ECOSYSTEMS

The concept of fragmentation of ecosystems refers to the situation in which an area is transformed into smaller areas due mainly to deforestation, or the conversion of native vegetation into other land uses, among other factors, generating an imbalance. This imbalance can trigger several environmental impacts, such as habitat loss, species extinction, decreased or even lost flow and genetic variability, increased edge effect and isolation, reduced biodiversity, increased erosion processes, as well as changes in the hydrological regime and loss of carbon pools, among others.

There are several ways to measure the fragmentation of an ecosystem. For its evaluation in this report, two indirect indicators were defined, namely: (i) Land Use and Land Cover and (ii) Proportionality, which will be detailed in the following items.

Regarding the associated EcS, both indicators can be related to most of the EcS selected in item 1.11. When it comes to ecosystem fragmentation, the more intact a region or Project Area, with less fragmentation, the more it contributes to maintaining environmental control, habitat preservation, and population dynamics. Thus, these two indicators cover both the provision, support and regulation services mentioned in the PES Law, as well as the regulation EcS mentioned in the selection of CICES, as indicated in the following tables.

Table 23. EcS related to indicators regarding Ecosystem Fragmentation, according to the PSA Law.

Section	Definition	Description of the EcS
Support	Services that maintain the longevity of life on Earth	Nutrient cycling, waste decomposition, production, maintenance or renewal of soil fertility, pollination, seed dispersal, control of populations of potential pests and potential vectors of human diseases, protection against solar ultraviolet radiation and maintenance of biodiversity and genetic heritage
Regulation	Services that contribute to the maintenance of the stability of ecosystem processes	Carbon sequestration, air purification, moderation of extreme weather events, maintenance of the balance of the hydrological cycle, minimization of floods and droughts and control of critical erosion and landslide processes of slopes

Table 24. EcS related to indicators regarding Ecosystem Fragmentation, according to CICES.

Section	Division	Group	Class	Description of the EcS
Regulation	Regulation of physical, chemical and biological conditions	Regulation of baseline flows and extreme events	Control of erosion rates	Control or prevention of soil loss
			Damping and attenuation of mass motion	Prevent landslides and avalanches from harming people
			Regulation of hydrological cycle and water flow	Regulation of water flows in the environment.

Section	Division	Group	Class	Description of the EcS
			(including flood control and coastal protection)	
		Maintenance of the life cycle and protection of habitat and genetic pool	Pollination	Pollination of fruit trees and other angiosperms
			Seed dispersal	Spreading seeds of wild plants
			Maintenance of nursery populations and habitats (including protection of the genetic pool)	Provide habitats for wild plants and animals that may be useful to humans
		Regulation of soil quality	Weathering processes and their effects on soil quality	Ensure that soils form and develop
			Decomposition and fixation processes and their effects on soil quality	Ensure that organic matter in soils is maintained
		Composition and atmospheric conditions	Regulation of the chemical composition of the atmosphere and oceans	Global climate regulation (carbon sequestration)
			Regulation of temperature and humidity, including ventilation and perspiration	Regulation of physical air quality for humanity

2.2.2.1. LAND USE AND LAND COVER – NATIVE VEGETATION COVER

The analysis of land use and land cover is extremely important to understand the dynamics and main characteristics of an area, which allows us to infer about the magnitude of its influence on the maintenance of EcS associated there, which were previously presented in Table 23 and Table 24.

In this context, according to the Methodology, as the Project Area, as well as its Area of Influence, is inserted in the Atlantic Forest Biome, which according to the Forest Code (Law No. 12,651/2012), requires at least 20% of the area of the rural property as a Legal Reserve, it was decided only to use the indicator of Native Vegetation Cover, referring to the coverage of native vegetation present in the reserve.

The Area of Influence defined for the indicator considers (i) the area of the *buffer* of 3 kilometers, added to the (ii) area of all the properties intersected by it (see item 1.9.3). The mapping of native vegetation was obtained as determined in the item 1.9.2 for this project.

Thus, to measure the indicator of Native Vegetation Cover according to the guidelines of the PSA Carbonflor Methodology, the generated data is presented in Figure 18 and in Table 25.

Figure 19. Indicator of Native Vegetation in the Area of Influence and in the Legado das Águas Project Area.
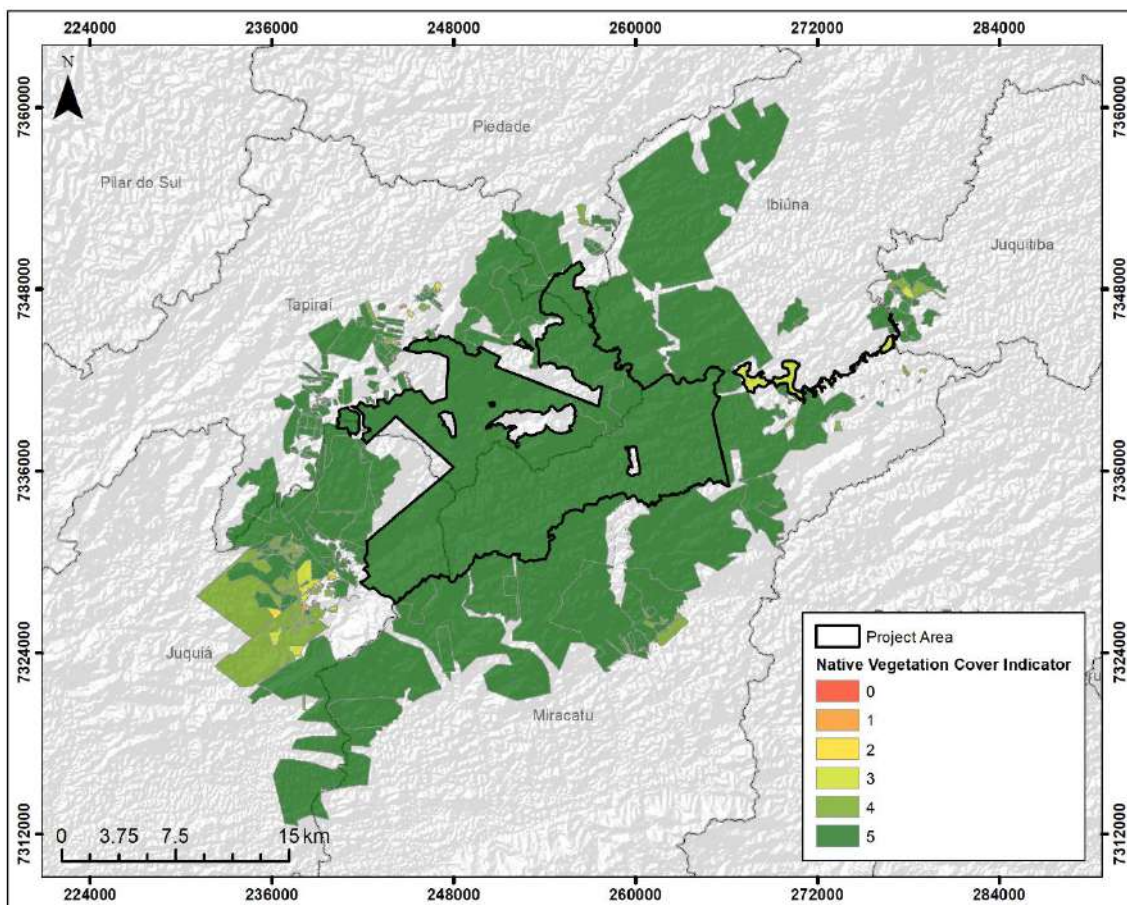
Table 25. Indicator of Native Vegetation Cover in the Area of Influence and in the Legado das Águas Project Area

Score	Legado das Águas		Jurupará Park		Private property	
	Qnt	%	Qnt	%	Qnt	%
1	0	0,00%	0	1	0	0,00%
2	0	0,00%	0	2	0	0,00%
3	1	25,00%	0	3	1	25,00%
4	0	0,00%	1	4	0	0,00%
5	3	75,00%	9	5	3	75,00%
n/i	0	0,00%	0	n/a	0	0,00%
Total	4	100%	10	Total	4	100%

*Qnt = number of properties in the respective NVC class. * n/i = no information.

According to the results, it can be observed that both in the Project Area and in the Area of Influence, the maximum score (5) predominated, that is, there was 80% to 100% of native vegetation cover in rural properties, and three of the four properties that make up the Project Area have this score. A score of 5 was also verified in 90% of the properties in Parque Jurupará and 67.20% of the private properties located in the Area of Influence.

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The Jurupará Park has only scores of 4 and 5, that is, it has more than 60% of native vegetation cover in each of the properties. The Project Area has scores of 3 and 5, while the private properties located in the Area of Influence present all coverage rates, in which 13 properties (3.47%) obtained a score of 1 (from 0 to 20.00% of coverage), 9 (2.40%) with score 2 (20.01% to 40.00% coverage), 29 (7.73%) score 3 (40.01% to 60.00% coverage), and 70 (18.67%) scored 4 (60.01% to 80.00% coverage).

The only property in the Project Area with a score below 5 is located in the extreme Northeast of the Project Area, which is the only rural property that is not directly connected with the rest of the Legado. It should be noted that, although not all Project Area properties have the maximum score for this indicator, the property with a score of 3 is the smallest and narrowest, representing only 2.1% of the total Project Area.

Thus, based on an area-weighted average of the 4 properties included in the Project Area, the average Legado das Águas score is 4.96 for this indicator.

Therefore, it is observed that the Project Area has, overall, a greater cover of native vegetation compared to its surroundings, reinforcing the importance of maintaining the conservation of Legado das Águas for the maintenance of the EcS offered there, thus mitigating the triggering of negative impacts that a greater fragmentation of the ecosystem could generate.

2.2.2.2. PROPORTIONALITY

One of the ways to indirectly analyze the fragmentation of an ecosystem is through the characterization of the size and shape of the fragments in the Project Area and its surroundings, relating these to the EcS associated with this indicator, which are presented in the Table 23 and Table 24.

For comparison purposes, the Area of Influence defined for this indicator considers (i) the area of *buffer* of 3 kilometers, added to the (ii) area of all the properties intersected by it (see item 1.9.3). The mapping of native vegetation was obtained as determined in item 1.9.2 for this project.

With the use of GIS tools, the fragments inserted in the Area of Influence were counted, as well as the areas of each fragment were measured for each property. Subsequently, the average and the sum of the areas of the fragments were calculated, as well as their total count, for each property.

For the classification of this indicator, the average of the areas of all fragments per property was used. From this, it was verified that most of the properties have a maximum of about 200 ha. Thus, it was defined that for an area to be classified as Very Large, it should present at least 200.01 ha of average area of all the fragments contained therein. In this context, to define the score of this indicator, 200.00 ha was defined as the maximum average area for a score of 4, and the lower scores were defined by decreased values of 50 ha, reaching intervals for each score according to the following table.

Table 26. Definition of the Proportionality indicator scoring ranges.

Indicator	Description	Intervals	Score
Proportionality (average area of	Very small	0.00 to 50.00 ha	1
	Small	50.01 to 100.00 ha	2
	Medium	100.01 to 150.00 ha	3

Indicator	Description	Intervals	Score
fragments per rural property)	Large	150.01 to 200.00	4
	Very large	Above 200.00 ha	5

With these definitions, each property was analyzed, the fragments were counted, and the scores were defined, reaching the results presented in Figure 20 and Table 27 below.

Figure 20. Proportionality Indicator in the Area of Influence and Legado das Águas Project Area.
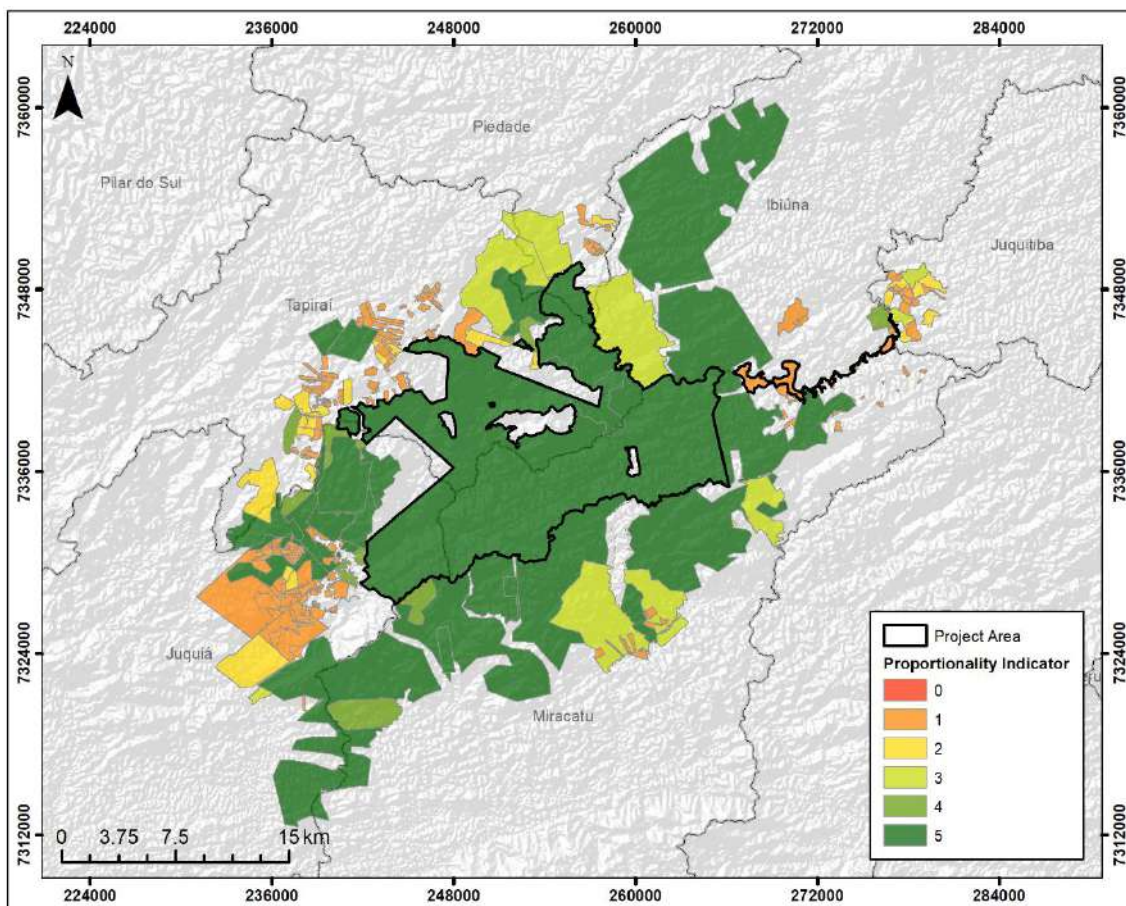
Table 27. Proportionality Indicator in the Area of Influence and Legado das Águas Project Area.

Score	Legado			Jurupará Park			Private property		
	No. Properties	%	No. frag.	No. Properties	%	No. frag.	No. Properties	%	No. frag.
1	1	25.00	79	5	50.00	13	313	83.47	775
2	0	0.00	2	0	0.00	0	27	7.20	54
3	0	0.00	0	1	10.00	17	8	2.13	54
4	0	0.00	0	1	10.00	1	6	1.60	32
5	3	75.00	4	3	30.00	44	20	5.33	30
n/i *	0	0.00	0	0	0.00	0	1	0.27	0
Total	6	100	96	10	100	75	375	100	945

* No. Properties = number of properties in the respective Property class. *No. frag = number of fragments in each Property class *n/i = No Information.

Thus, it was possible to verify that three of the four properties that make up the Project Area have the maximum score, that is, have an average area of fragments greater than 200.01 ha. The property located to the northeast has a score of 1, however, when considering that the area of this property represents less than 5% of the entire extension of the Project Area and when considering the weighted average of the total area, the score of the Legado das Águas Project Area is 4.92.

When comparing with private properties in the Area of Influence, it is noted that the vast majority of properties have fragments smaller than 50 hectares, that is, score 1, pointing to a greater fragmentation of their ecosystems in relation to the Legado. As shown in the figure above, there are also concentrations of scores between 1 and 3 in the Area of Influence, evidenced by orange and yellowish colors, which point to a greater potential for fragmentation of the ecosystem on properties neighboring the Legado.

According to these analyses, it can be said that the Project Area has an important function with regard to proportionality, as it contains larger fragments and has less fragmentation of the ecosystem compared to its Area of Influence, which allows the habitat established there to be conducive to physical and biotic development.

2.2.3. PPA CONSERVATION

A well-preserved Permanent Preservation Area has several functions, such as the protection of a water body, the prevention of natural disasters, the mitigation of soil erosion and sedimentation of rivers and lakes, the maintenance of biodiversity, among others, which help in the maintenance and preservation of the associated EcS.

Regarding the EcS associated with this indicator, it is possible to list all the EcS selected in item 1.11, as can be seen in the tables below. When it comes to the association of native vegetation and water resources, we can encompass all the EcS selected by the proponent for the development of the Methodology, because in the Brazilian scenario and in the Atlantic Forest biome, this is an association that offers a great wealth of EcS.

Table 28. EcS related to the PPA Conservation indicator, according to PSA Law.

Section	Definition	Description of the EcS
Support	Services that maintain the longevity of life on Earth	Nutrient cycling, waste decomposition, production, maintenance or renewal of soil fertility, pollination, seed dispersal, control of populations of potential pests and potential vectors of human diseases, protection against solar ultraviolet radiation and maintenance of biodiversity and genetic heritage
Regulation	Services that contribute to the maintenance of the stability of ecosystem processes	Carbon sequestration, air purification, moderation of extreme weather events, **maintenance of the balance of the hydrological cycle, minimization of floods and droughts and control of critical erosion and landslide processes of slopes**
Cultural	Services that constitute non-material benefits provided by ecosystems	Recreation, tourism, cultural identity, spiritual and aesthetic experiences and intellectual development, among others

Table 29. EcS related to the PPA Conservation indicator, according to CICES.

Section	Division	Group	Class	Description of the EcS
Regulation	Regulation of physical, chemical and biological conditions	Regulation of baseline flows and extreme events	Control of erosion rates	Control or prevention of soil loss
			Buffering and attenuation of mass movement	Prevent landslides and avalanches from harming people
			Regulation of hydrological cycle and water flow (including flood control and coastal protection)	Regulation of water flows in the environment.
		Maintenance of the life cycle and protection of habitat and genetic pool	Pollination	Pollination of fruit trees and other angiosperms
			Seed dispersal	Spreading seeds of wild plants
			Maintenance of nursery populations and habitats (including protection of the genetic pool)	Provide habitats for wild plants and animals that may be useful to humans
		Regulation of soil quality	Weathering processes and their effects on soil quality	Ensure that soils form and develop
			Decomposition and fixation processes and their effects on soil quality	Ensure that organic matter in soils is maintained
		Atmospheric composition and conditions	Regulation of the chemical composition of the atmosphere and oceans	Global climate regulation (carbon sequestration)
			Regulation of temperature and humidity, including ventilation and transpiration	Regulation of physical air quality for humanity
Provision	Water	Surface water used for nutrition, materials or energy	Surface water for drinking	Drinking water from sources at the surface
			Surface water used as a material (non-drinking purposes)	Surface water that we can use for things other than drinking
			Freshwater surface water used as an energy source	Hydropower

The present PPA Conservation indicator allows the verification of these PPAs, enabling a diagnosis of the Area of Influence regarding its conservation.

The Area of Influence defined for this indicator considers (i) the buffer area of 3 kilometers (Region of Influence), plus (ii) the area of all properties intersected by it (see item 1.9.3). Native vegetation mapping was obtained as determined in item 1.9.2 for this project.

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With the Area of Influence defined, information regarding the PPA was obtained through FBDS[44] data and, with the verification through GIS tools, the PPAs were mapped, divided by property. Afterwards, the PPAs were intersected with the vegetation cover mapping, and the native vegetation cover per APP, per property, called the effective PPA, was calculated.

Thus, the percentage of coverage with native vegetation in the PPA was obtained through the ratio between the effective PPA and the total PPA area each property (area of mandatory APP defined PPA law). Then, the percentages were distributed between scores 1 (up to 70% of native vegetation in the PPA area), 3 (between 70% and 80%), 4 (between 80% and 90%) and 5 (above 90%), as described in the Methodology.

The results generated can be seen in Figure 21 and Table 30 presented below.

Figure 21. PPA Conservation Indicator in the Area of Influence and in the Legado das Águas Project Area.

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[44] Available at: https://geo.fbds.org.br/
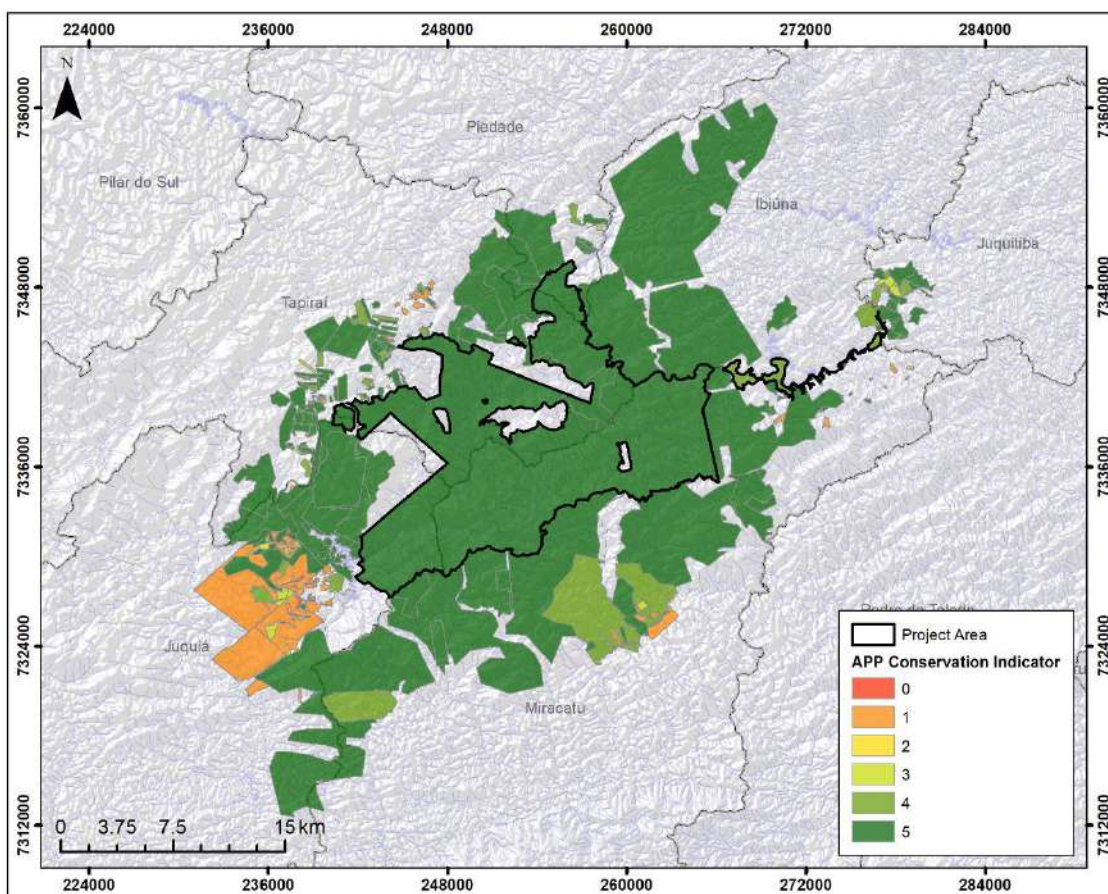
Table 30. PPA Conservation Indicator in the Area of Influence and Legado das Águas Project Area.

Score	Legado das Águas		Jurupará Park		Private property	
	No.	%	No.	%	No.	%
1	0	0.00%	0	0.00%	92	24.53%
3	0	0.00%	1	10.00%	30	8.00%
4	1	25.00%	0	0.00%	41	10.93%
5	3	75.00%	9	90.00%	184	49.07%
n/I *	0	0.00%	0	0.00%	28	7.47%
Total	6	100%	10	100%	375	100%

*No. = number of properties in the respective APPC class. * n/i = no information.

Observing the presented data, it is noticeable that most of the analyzed properties, both inside and outside the Project Area, present the best score of native vegetation cover in PPAs, that is, the mandatory areas of PPA are, overall, preserved. In the perimeter of the Project Area, there is the exception of the Fumaça property (Northeast region of the Legado).

It was also possible to verify that, of the private properties located in the Area of Influence, only those that are not inserted in the Jurupará Park present areas that have less conserved PPAs, in the lowest score class, with less than 70% of native vegetation (18.90% of them, or 72 properties, with the lowest score). These properties are mostly concentrated in the municipality of Juquiá, southwest of the Project Area. Some properties with this same score were identified in the municipalities of Tapiraí, West of the Legado, and others distributed in the municipalities of Miracatu, to the East and Northeast direction in relation to the Project Area.

All regions that have properties with the lowest score of the indicator also have some properties with preserved PPAs between 80% and 90% of native vegetation (score 4) in the surroundings, as well as others in the municipalities of Juquitiba and Ibiúna (direction North – Northeast in relation to Legado).

In a smaller amount, properties with a score of 3 (between 70% and 80% of PPA conservation) are found in regions close to those with a score of 4, being 30 (8.00%) private properties located outside the park area, in the Area of Influence, and 1 (10.00%) located in the surrounding Jurupará Park.

It is noteworthy that, as well as is the case with the Land Use and Land Cover Indicator, although not all the properties of the Legado das Águas have the maximum score in this indicator, the property with a score of 4 represents only 2.1% of the total area and, from an average weighted by the area of all the properties inserted there, the average score of Legado das Águas is 4.98.

Thus, it is possible to conclude that the Legado, as well as the Jurupará park in its surroundings, presents a number of properties with maximum score substantially higher than the private properties located in the Area of Influence, being possible to highlight the importance of the Legado Area when we refer to the maintenance of the EcS related

to the conservation of native vegetation in PPAs in their properties and the influence of this characteristic for the hydrological cycle of the region in which it is inserted.

2.2.4. DENSITY OF SPRINGS

The high density of springs in a given area is of great importance when referring to the provision of water to the regions downstream of its location. Thus, for the indirect measurement of the benefits that the conservation of springs can bring, an indicator was used that calculates the density of springs per property, through the ratio between the total number of springs per property and the extension of each property, in hectares.

With regard to the EcS associated with this indicator, it is possible to relate the EcS that deal with water resources selected in item 1.11, as shown in the following tables.

Table 31. EcS related to the Density of Springs indicator, according to PES Law.

Section	Definition	Description of the EcS
Provision	Services that provide environmental goods or products used by humans for consumption or marketing	Water, food, wood, fibers and extracts, among others
Regulation	Services that contribute to the maintenance of the stability of ecosystem processes	Carbon sequestration, air purification, moderation of extreme weather events, maintenance of the **balance of the hydrological cycle, minimization of floods and droughts** and control of critical erosion and slope slide processes

Table 32. EcS related to the Density of Springs indicator, according to CICES.

Section	Division	Group	Class	Description of the EcS
Regulation	Regulation of physical, chemical and biological conditions	Regulation of baseline flows and extreme events	Regulation of hydrological cycle and water flow (including flood control and coastal protection)	Regulation of water flows in the environment.
		Maintenance of the life cycle and protection of habitat and genetic pool	Maintenance of nursery populations and habitats (including protection of the genetic pool)	Provide habitats for wild plants and animals that may be useful to humans
Provision	Water	Surface water used for nutrition, materials or energy	Surface water for potable purposes	Drinking water from sources on the soil surface
			Surface water used as material (for non-potable purposes)	Surface water that can be used for purposes other than the consumption of drinking water

According to the Methodology, the considered Area of Influence includes (i) the established *buffer* of 3 km and (ii) all rural properties registered in the CAR intersected by it, totaling 389 properties, 4 of which are inserted in the Project Area (see item 1.10.2.3).

With the information cited above, a Ranking was created, defining the property with the highest density (springs/ha) as 1, the second highest density as 2, and so on, until the area of lowest density. It was then verified that, of the 389 properties, 207 have one or more springs, and the rest (182 properties) have zero density, that is, they do not present any spring within the limits of the property, which are classified with a score of 1.

To define the scores of the other properties, the total value of non-null properties (207) was divided by 4, generating a classification interval m of approximately 52. Thus, the 52 properties with highest density of springs were classified with a score of 5, the next 52 properties with a score of 4, and so on, generating the distribution as shown in the graph in Figure 22, Table 33, and Figure 23 below.

Figure 22. Distribution of the density of springs of the properties in Legado das Águas Project Area and the Area of Influence.
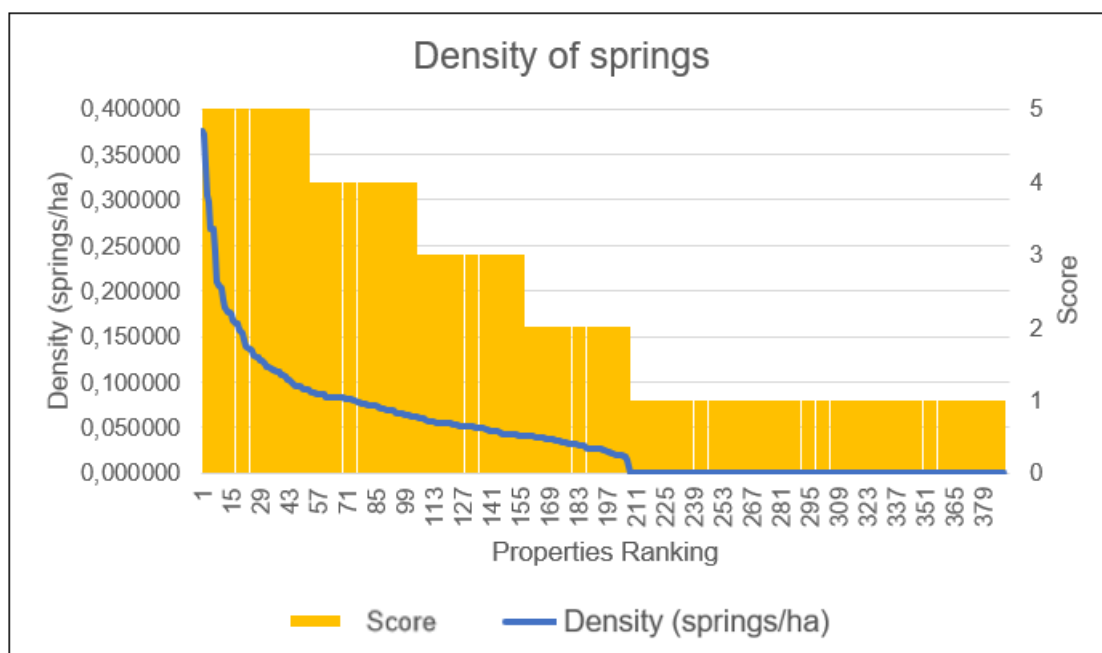
Table 33. Density of Springs indicator in the Area of Influence and Legado das Águas Project Area.

Score	Description	Density [springs/ha]	Legado		Park		Private property	
			No.	%	No.	%	Qnt	%
1	Null	0	0	0.00%	2	20.00%	180	48.00%
2	Low	between 0.0411 and 0.001	1	25.00%	1	10.00%	49	13.07%
3	Average	between 0.0617 and 0.0412	3	75.00%	5	50.00%	44	11.73%
4	High	between 0.0920 and 0.0618	0	0.00%	1	10.00%	51	13.60%
5	Very High	between 0.3754 and 0.0921	0	0.00%	1	10.00%	51	13.60%
	Total		4	100.00%	10	100.00%	375	100.00%

*No. = number of properties in the respective SD class.

Figure 23. Density of Springs Indicator in the Area of Influence and in the Legado das Águas Project Area.
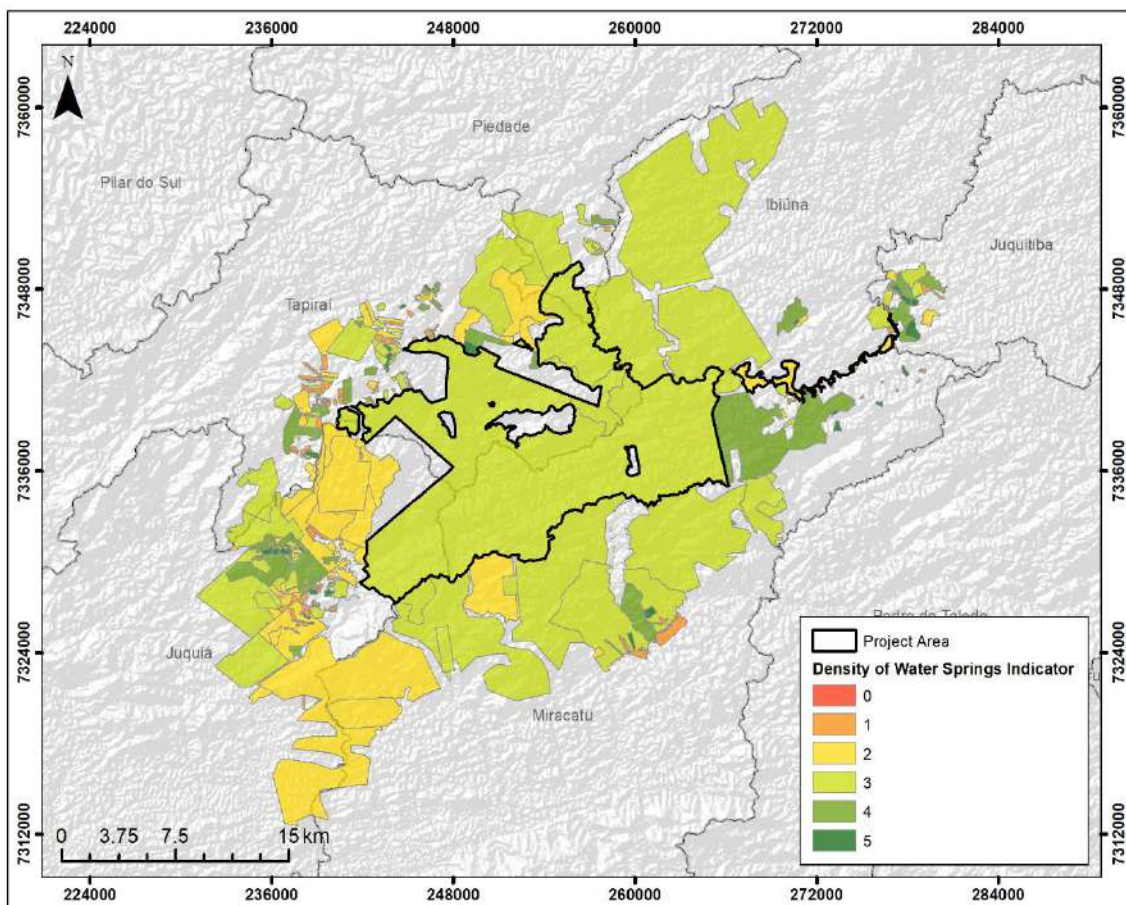
According to the presented results, it was possible to verify that, proportionally, the Legado Project Area presents a density of medium relevance when compared to the Area of Influence, with three of its properties (75.00%) presenting a score of 3 and one with a score of 2 (southern region of the Legado Area). As for private properties in the Area of Influence, 48% that are not included in the Jurupará Park have a score of 1, that is, 48% of the properties do not have springs on their property.

It should be noted that properties with scores of 4 and especially 5, despite having a high density of springs and being extremely important for water conservation, have considerably smaller areas when compared to the Project Area, and smaller absolute number of springs.

In this context, the property with the highest score, for example, is located in the Area of Influence and has a spring density of 0.375 springs/ha against 0.057 springs/ha in one of the properties in the Project Area with a score of 3. However, this higher density property has only 2 springs, while the Project Area property has 1,180 springs.

In addition, the Project Area has 1,337 springs in its entire area, representing almost a third 1/3 of the number of springs, considering the Project Area and Area of Influence, which together have a total of 4,282 springs, of which 2,945 located in the Area of Influence.

Taking a weighted average of all properties included in the Project Area, the average score for the Legado Area is 2.98 for this indicator. Despite the average score of

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approximately 3 for the studied area, one cannot ignore the relevance of the conservation of its springs for a better provision of water resources, both in quantity and quality, for the regions directly and indirectly affected by the Project Area.

2.2.5. BIODIVERSITY

The biodiversity of an area refers to the set of all species of living beings that are in it, as well as its set of genes, its interspecific and intraspecific relationships, and the ecosystem.

By influencing the provision of various ecosystem services, biodiversity becomes an important indicator to be evaluated within a natural ecosystem. As it underpins ecological processes, influences climate regulation, assists in the maintenance of water processes, pollination and pest control. Biodiversity, in itself, is considered an ecosystem service when we consider medicinal plants, supply of seeds, food from various crops, in addition to its value as a supply of cultural services.

Table 34. EcS related to the Biodiversity indicator, according to Law No. 14,119/2021, on Payment for Environmental Services.

Section	Definition	Description of the EcS
Support	Services that maintain the longevity of life on Earth	Nutrient cycling, waste decomposition, production, maintenance or renewal of soil fertility, pollination, seed dispersal, control of populations of potential pests and potential vectors of human diseases, protection against solar ultraviolet radiation and maintenance of biodiversity and genetic heritage
Regulation	Services that contribute to the maintenance of the stability of ecosystem processes	Carbon sequestration, air purification, moderation of extreme weather events, maintenance of the balance of the hydrological cycle, minimization of floods and droughts and control of critical erosion and slope slide processes
Cultural	Services that constitute non-material benefits provided by ecosystems	Recreation, tourism, cultural identity, spiritual and aesthetic experiences and intellectual development, among others

Table 35. EcS related to the Biodiversity indicator, according to CICES.

Section	Division	Group	Class	Description of the EcS
Regulation	Regulation of physical, chemical and biological conditions	Regulation of baseline flows and extreme events	Regulation of hydrological cycle and water flow (including flood control and coastal protection)	Regulation of water flows in the environment.
		Maintenance of the life cycle and protection of habitat and genetic pool	Pollination	Pollination of fruit trees and other angiosperms
			Seed dispersal	Spreading seeds of wild plants
			Maintenance of nursery populations and habitats (including protection of the genetic pool)	Provide habitats for wild plants and animals that may be useful to humans
		Regulation of soil quality	Decomposition and fixation processes and their effects on soil quality	Ensure that organic matter in soils is maintained
		Atmospheric composition and conditions	Regulation of temperature and humidity, including ventilation and transpiration	Regulation of physical air quality for humanity
Provision	Water	Surface water used for nutrition, materials or energy	Surface water used as an energy source	Hydroelectric power

The measurement of biodiversity was made by obtaining indirect indicators, through the evaluation of habitat quality and the presence of key species in the Fauna and Flora of the Legado das Águas.

The relevant information for the measurement of biodiversity was obtained from the monitoring agents of the Legado das Águas, through the sending of reports, lists of species and direct communications about the projects carried out during the PES monitoring period.

Regarding the flora, the work of Colleta (2016), brings a detailed list of the vascular species present in the Legado, highlighting species with ecological importance and those with some degree of endangerment. In addition, work was developed related to soil fertilization and dispersal of mycorrhizal fungi by mammals, developed in partnership with researchers from UNESP[45], monitoring and rescue of orchids in partnership with

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[45] Soil fertilization and dispersal of mycorrhizal fungi by mammals in the Atlantic Forest. Principal Investigator: Leticia Bulascoschi Cagnoni; General Advisor: Prof. Dr. Mauro Galetti; Co-supervisors: Dr. Jose Ignácio Fernández de la Pradilla Villar and Dr. Claudia Paz; External collaborator: Simon Queenborough – Yale University

Zandoná Conservação[46], study on aluminum accumulation in native species[47] and experiments with the species Dioclea violácea, known as Olho de Boi.

Regarding fauna, between 2017 and 2018 a project for monitoring top-of-the-chain species[48], known as Onças do Legado Project, was carried out in partnership with the Instituto Pró-Carnívoros, in which two specimens of jaguar were monitored. Currently, the Legado has the partnership of the Onçafari organization, with monitoring campaigns, delivery of periodic technical reports and dissemination of the results of monitoring with trap cameras until the year 2022[49,50,51].

As described in the Fauna and Flora section, the Legado das Águas is home to an important population of the southern muriqui primate (*Brachyteles arachnoides*). The monitoring of this population was carried out in partnership with the PROMURIQUI Institute, UNIFESP and IUCN/SSC Primate Specialist Group[52].

In addition, a survey of the butterflies of the Legado das Águas was carried out[53] between 2016 (prior to the beginning of the monitoring period) and 2019, having as a product a book that catalogs the species that occur in the Legado, and relevant characteristics such as new, rare and bioindicator species. Finally, there is a fish guide to the Ribeira de Iguape River basin, focusing on the Juquiá River[54].

For the monitoring of fauna and flora, comprising the year 2022, the evaluations of land use changes, made with geoprocessing tools, indicated the conservation of the vegetation of the Legado das Águas (item 2.4), an important result to corroborate the maintenance of biodiversity monitored in previous years, indicated by the studies mentioned previously.

The data obtained followed the guidance of the Methodology, in which lists of species of fauna and flora and cartographic products resulting from the characterization of the habitat (see section 1.10.4, PSA Carbonflor Methodology) were used as a basis for filling in the tables below, which demonstrate the composition of biodiversity indicators.

Table 36. Biodiversity Indicators – Vegetation.

Vegetation structure	Level	Score
Physiognomy	**(C)** Closed forest physiognomy, with a tendency of continuous distribution of canopies, and the canopy may or may not present emerging trees.	C = 5 points
Forest stratification	**(C)** Well-defined forest stratification, with trees, shrubs, terrestrial herbs, vines, epiphytes, etc., whose abundance	C = 5 points

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[46] Orchids of the Legado das Águas – Reservas Votorantim. Zandoná Conservação.

[47] Accumulation of aluminum in species of the genus Miconia: distribution of Al in the plant and relationship with herbivory. Responsible researcher: Luá Taibo Timpone – UNESP/Rio Claro.

[48] Top-of-the-Chain Predators - An Alternative Biodiversity Conservation Tool in the Atlantic Forest". Instituto Pró-Carnívoros.

[49] https://www.youtube.com/watch?v=my0TzQJw0Kg

[50] https://www.youtube.com/watch?v=Rw7hYEOgIDw

[51] https://www.youtube.com/watch?v=aRAet0yDX1g

[52] POPULATION MONITORING OF SOUTHERN MURIQUIS (Brachyteles arachnoides) IN THE RESERVAS VOTORANTIM LEGADO DAS ÁGUAS-SP. Maurice Talebi. UNIFESP; PROMURIQUI INSTITUTE; IUCN/SSSC PRIMATE SPECIALIST GROUP.

[53] Butterflies of the Legado das Águas. Laura Braga. Reservas Votorantim, 2022

[54] FISH IN THE AREAS OF INFLUENCE OF THE RESERVAS VOTORANTIM - LEGADO DAS ÁGUAS-RIBEIRA DE IGUAPE RIVER BASIN, SP. Legado das Águas Reserva & Proeco Environmental Consulting.

Vegetation structure	Level	Score
	and number of species vary according to climate and location. The upper canopies are usually horizontally wide	
Diametric distribution of tree individuals	**(C)** Average DBH of the trunks is always greater than 20 cm. The diametric distribution has great amplitude, providing good woody product.	C = 5 points
Presence of epiphytes	**(C)** Epiphytes are present in a large number of species and with great abundance.	C = 5 points
Presence of litter	**(C)** Litter is present, varying as a function of time and location, is easily detected and presents intense decomposition	C = 5 points
Plant Diversity	**(C)** Biological diversity is very large due to the complexity, structure, and number of species.	C = 5 points
Total		30 points

Table 37. Biodiversity Indicators – Disturbance Factors

Disturbance Factors	Level	Score
Fire Frequency in the area	**(C)** Low – every 5 to 10 years	C = 5 points
Presence of cattle or any domesticated animal inside the fragment of native vegetation	**(C)** Low – 0 to 20%	C = 5 points
Presence of vines	C) Absence of vines covering the trees on the edge of the fragment. Inside, when present, they are usually woody.	C = 5 points
Presence of invasive grasses	**(C)** Low – 0 to 20%	C = 5 points
Presence of exotic trees	**(C)** Low – 0 to 20%	C = 5 points
Presence of selective wood cutting in the area	**(C)** Low – 0 to 20%	C = 5 points
Total		30 points

Table 38. Biodiversity Indicators – Fauna.

Fauna	Level	Score
Key/top-of-chain species records	**(A)** No records **(B)** 1 or more records	B = 5 points
Presence of globally or nationally endangered species	**(C)** Vulnerable **(D)** Endangered **(E)** Critically Endangered	C = 5 points
Evidence from well-established populations	**(B)** 1 to 3 species **(C)** 3 to 5 species **(D)** 5 or more species	C = 5 points

Considering the results obtained in the analysis of the indicators and the context of the Project Area, where there is no product extraction from nature, such as food and wood for use in society, the Project Area is considered to be fulfilling relevant roles in ecosystem services aimed at support, regulation and culture, according to the list of ecosystem services presented by Law No. 14,119/2021, which establishes the National Policy on Payment for Environmental Services (Table 34).

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Moreover, considering CICES, the biodiversity of the Project Area represents an important set of ecosystem services, listed in the Table 35. Regarding provision, the Legado das Águas acts as an important source of energy, by housing surface water used as an energy source (Table 35, Table 15).

The evaluations presented in Table 36, Table 37 and Table 38 can be corroborated by studies carried out in the Legado das Águas, which prove, through photos and georeferenced trails, the presence of vegetation in a good state of conservation and key species of fauna, or species that are top of the chain and/or have some degree of threat.

The studies are part of the internal archives of the Legado das Águas and include technical reports, which monitor the presence of fauna in the Project Area and its surroundings, as well as a guide to the identification of species of its fauna and flora.

2.3.   MATRIX OF ECOSYSTEM INDICATORS

According to the Methodology and to the indicators calculated and described above, the Matrix of Ecosystem Indicators was constructed, presented in the Table 39 below.

Table 39. Ecosystem Indicators scores.

Indicator	Measurement Method	Score	Weight
Land Use and Land Cover – Native Vegetation (I_{NVC})	Percentage of native vegetation cover in the Project Area	4,96	1
Proportionality (I_{Prop})	Average size of fragments in the Project Area versus Area of Influence.	4,92	1
Conservation of PPA (I_{APPC})	Effective PPA area versus mandatory PPA.	4,98	1
Spring Density (I_{SD})	Average spring density in the Project Areas versus Area of Influence.	2,98	1
Biodiversity (I_{BD})	Vegetation and fauna status, and disturbance potential	75	3
Total			7

The normalization of the score was made according to Equation 12 of the Methodology, presented below:

Equation 1. Equation of Ecosystem Indicators.

$$Matrix\ of\ Ecosystem\ Indicators\ (\%)$$
$$= 100\ x\ \frac{I_{NVC} + I_{NVCBLR} + I_{Con} + I_{Prop} + I_{SWQ} + I_{APPC} + I_{SD} + 3\ x\ I_{BD}}{2 + n}$$

For the use of the equation, the "Parameters of the equation of the Matrix of Ecosystem Indicators" presented in the pertinent item of the Methodology were considered, of which those applicable to this project are presented below:

Table 40. Parameters of the equation of the Matrix of Ecosystem Indicators.

Name	Acronym		Scoring Parameter	Calculated score
Native Vegetation Cover	I_{NVC}	=	$\dfrac{\text{NVC Score}}{5}$	0,99
Proportionality	I_{Prop}	=	$\dfrac{\text{Proportionality Score}}{5}$	0,98
Conservation of PPAs	I_{APPC}	=	$\dfrac{\text{PPA Conservation Score}}{5}$	1,00
Density of springs	I_{SD}	=	$\dfrac{\text{Density of Springs Score}}{5}$	0,60
Biodiversity	I_{BD}	=	$\dfrac{\text{Biodiversity Score}}{75}$	1
	n	=	Number of quantified EcS indicators	5

Applying the parameters of Table 40 in the Matrix of Ecosystem Indicators equation we have:

Equation 2. Calculation of the Matrix of Ecosystem Indicators.

$$Matrix\ of\ Ecosystem\ Indicators\ (\%) = 100\ x\ \frac{0,99 + 0,98 + 1\ +\ 0,60 + \ 3\ x\ 1}{2 + 5}$$

Matrix of Ecosystem Indicators = 93.86%

It should be noted that, according to the Methodology, there are 4 mandatory Ecosystem Indicators (I_{sc}, I_{NVC}, I_{APPC}, I_{BD}) and a requested extra indicator. This report, as mentioned in item 1.12, used two non-mandatory indicators, one of them being beyond what is required by the methodology for the development of the Legado das Águas project, namely, I_{Prop} and I_{SD}.

Thus, as one more indicator than necessary was quantified, there is an extra score bonus of 2.00% and, therefore, the Matrix's final score is 95.86%.

2.4. VERIFICATION OF ENVIRONMENTAL SERVICES

This item is intended for the monitoring results obtained for the Legado das Águas and respective Project Area, following the guidelines of the Carbonflor Methodology and with the application of the monitoring methods presented above (see item 1.13), during the first monitoring period of the PSA Carbonflor in the Legado das Águas. The effectiveness of the provision of EnS by Reservas Votorantim (see item 1.10.6) will be verified from December 2017 to May 2023 (see item 1.8).

2.4.1. ECOSYSTEM MAINTENANCE SUPPORT

Through geospatial analysis it was possible to verify monitoring factors such as (i) deforestation history, (ii) fire disturbances, and (iii) tree canopy forest cover, which offer data to verify the maintenance of the ecosystem in the Project Area.

To determine the absence of deforestation or illegal logging activities, deforestation information provided by the TerraBrasilis/INPE platform was sought. The available data indicate the places where there was deforestation recorded in the period between 2008 and 2022, as shown in the following figures.

Figure 24. Deforestation Records from 2008 to 2018.
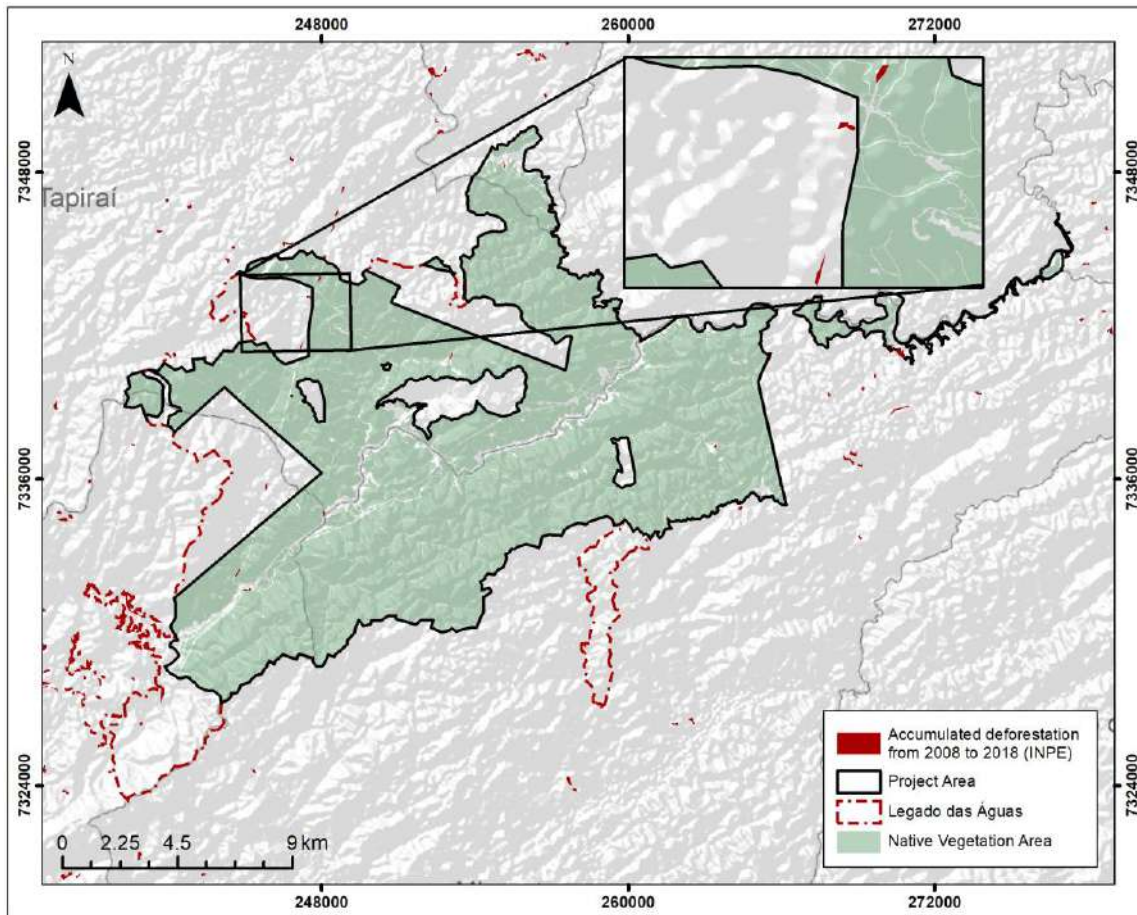
Source: INPE.

The image that covers the period from 2008 to 2018 shows that the deforestation activity recorded in the Legado das Águas is very low in the years leading up to the beginning of the PSA Carbonflor Valuation Period. It is also noteworthy that these areas were discounted for the calculation of the Native Vegetation Area (see item 1.9.2).

Figure 25. Deforestation Records from 2019 to 2022.
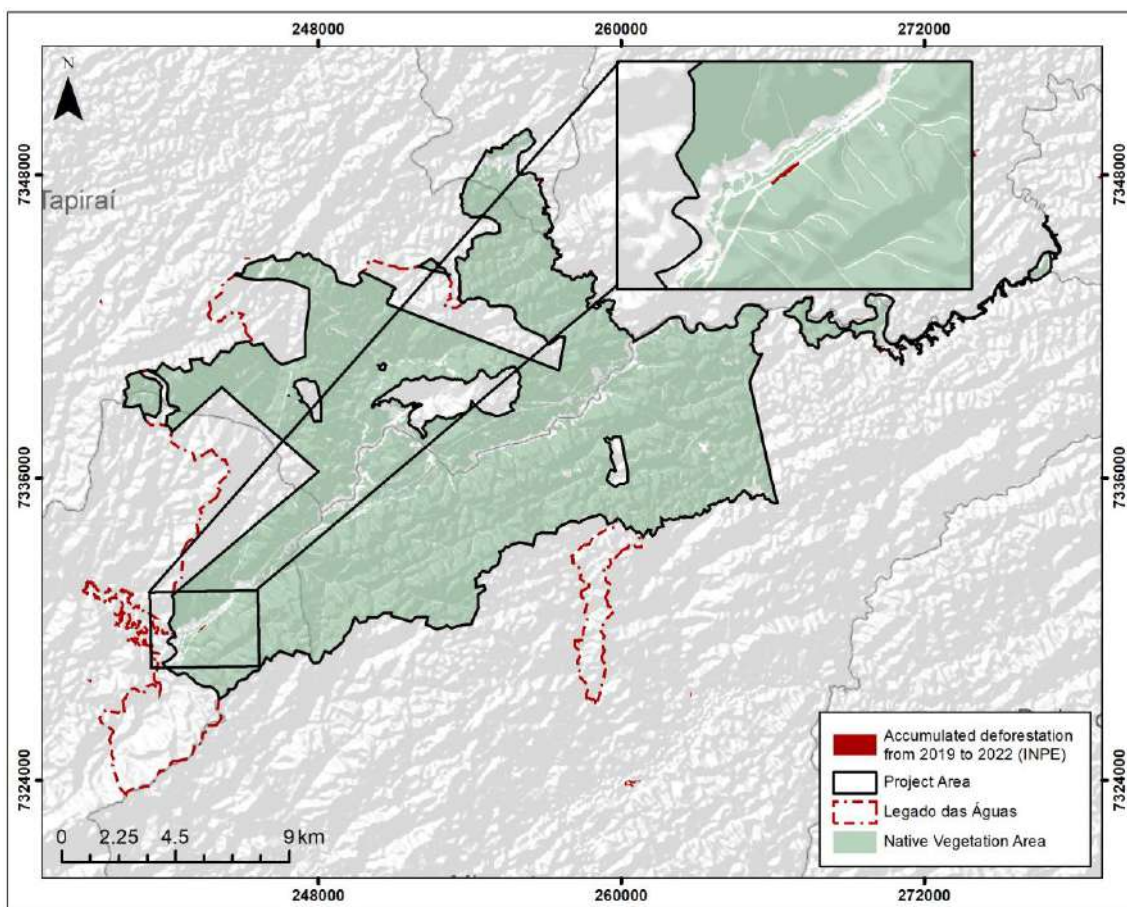
Source: INPE.

From the image of the period between 2019 and 2022, when the valuation is being accounted for, it is possible to verify that the occurrences of deforestation are even lower than in the previous period (Figure 24), pointing to the effectiveness of the conservation service in the Legado das Águas.

For the monitoring of disturbances by fires, data from the MapBiomas Fogo project and satellite images were used, in addition to the owner's report on fires in the region, in order to identify any occurrences of fire or fire outbreaks. However, no occurrences of fire were identified by any of the data sources used, and the last occurrence was reported by employees of the Reservas Votorantim more than 40 years ago, demonstrating that the site is in condition of environmental balance and that the actions to protect the area are being effective.

Also, through Landsat satellite images, with an accuracy of 30 meters, it was possible to map the forest cover of the tree canopy in the Project Area, as shown in the subsequent figures. It is possible to observe the absence of significant changes since the beginning of the Valuation Period in 2017

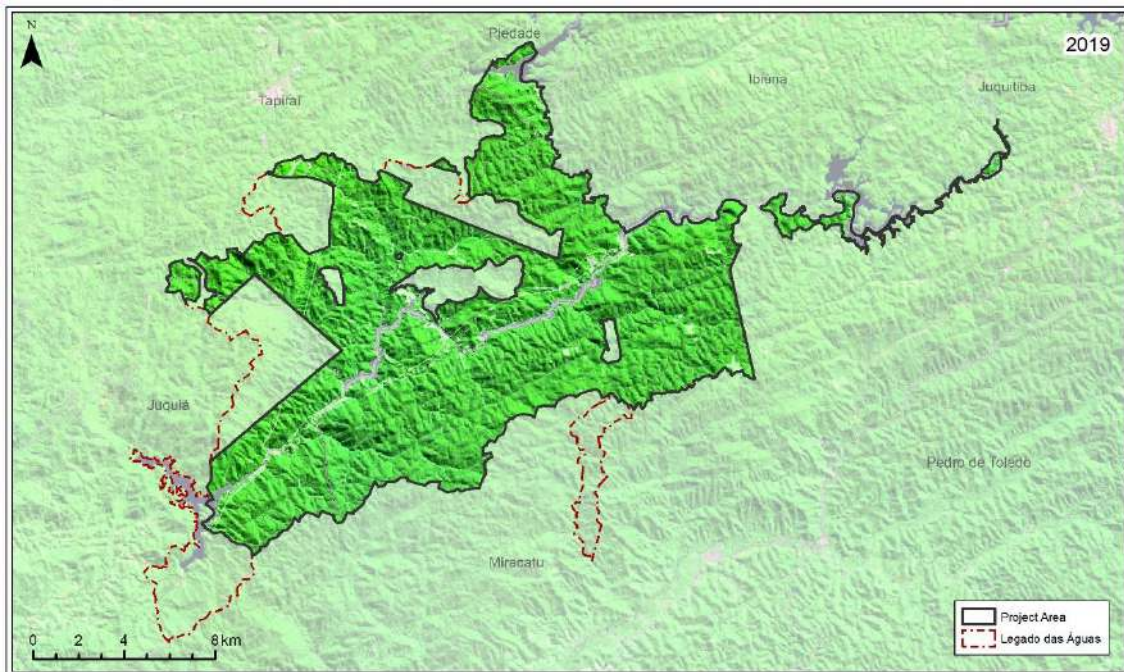Figure 26. Vegetation cover in the Project Area, 2017.
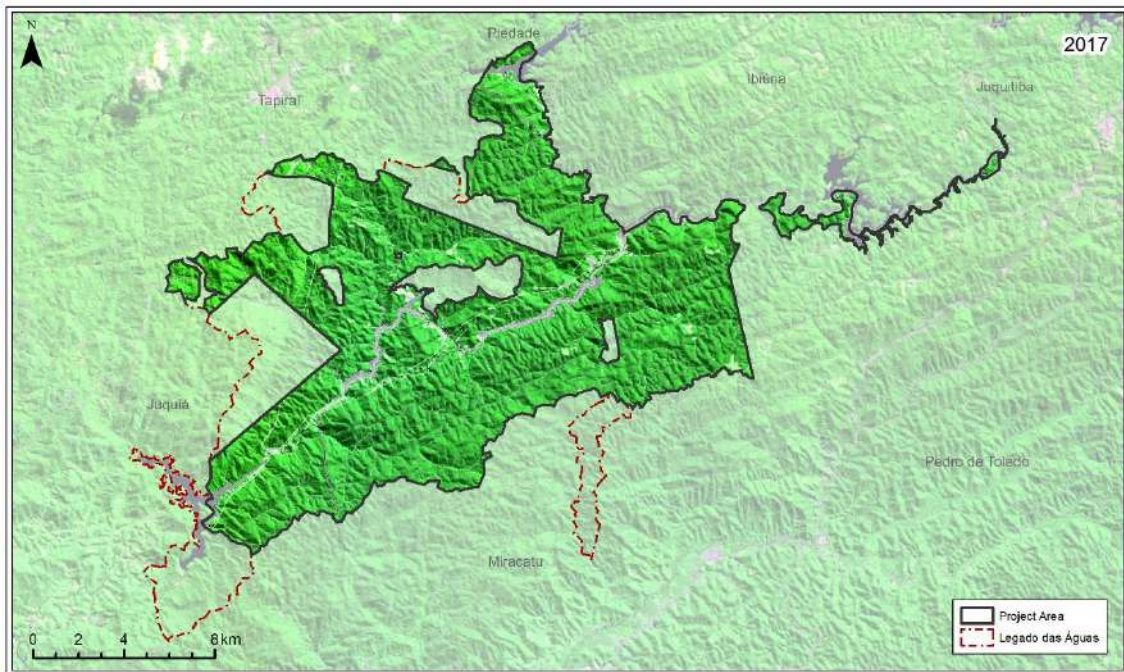
Landsat Image.

Figure 27. Vegetation cover in the Project Area, 2018.
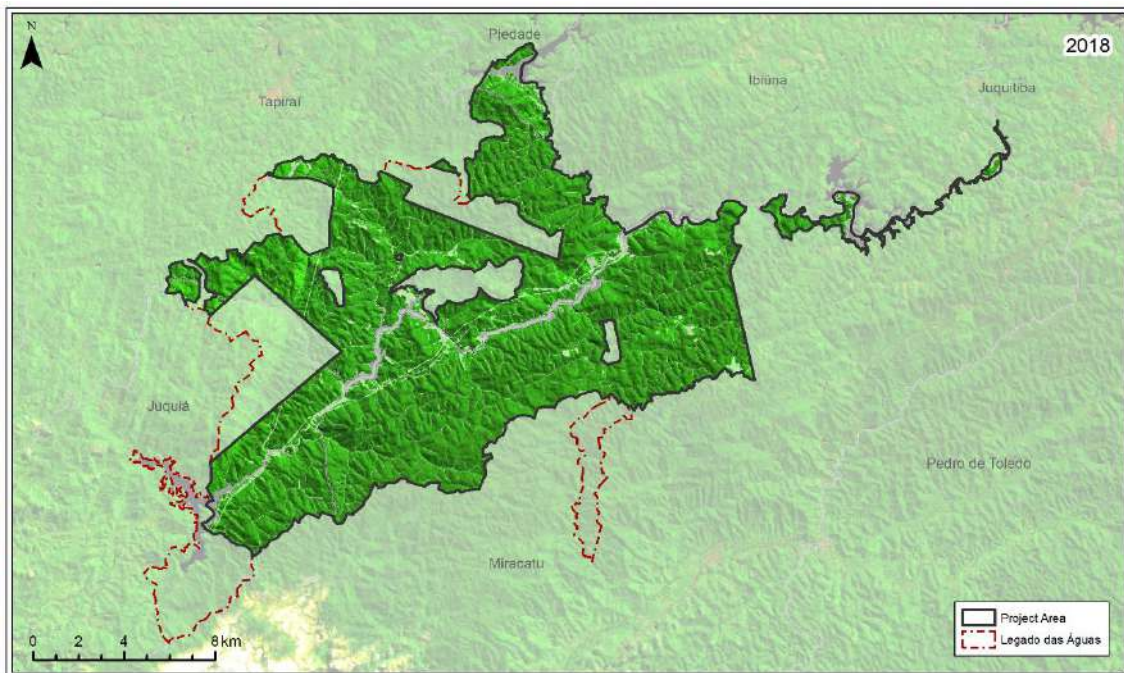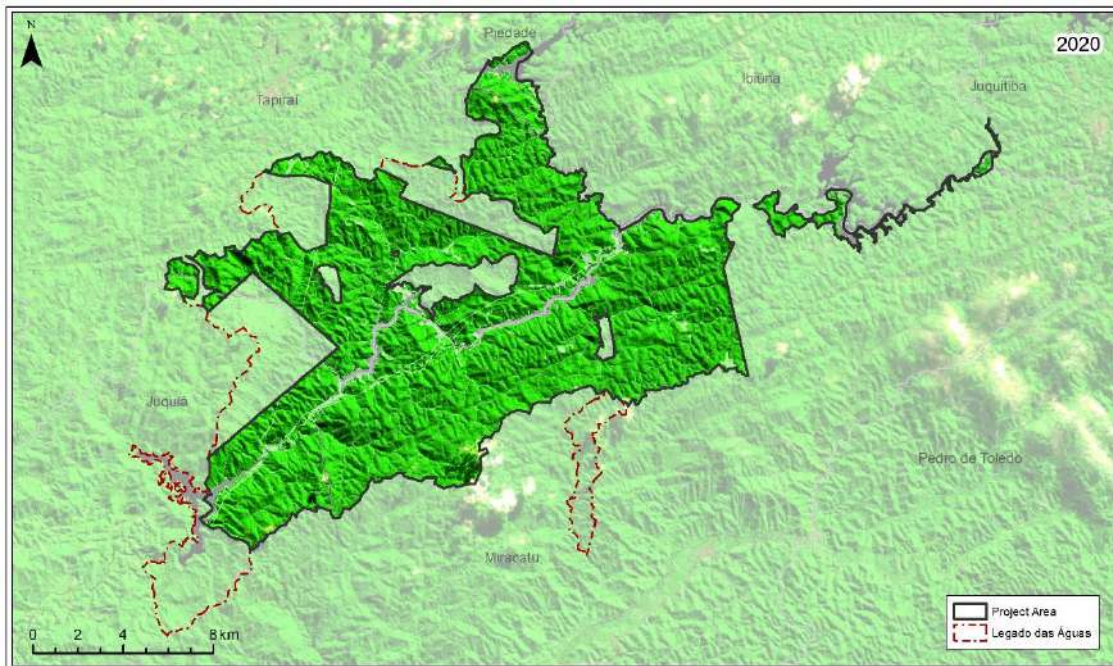

Landsat Image.

Figure 28. Vegetation cover in the Project Area, 2019.

Landsat Image.

Figure 29. Vegetation cover in the Project Area, 2020.

Landsat Image.

Figure 30. Vegetation cover in the Project Area, 2021.
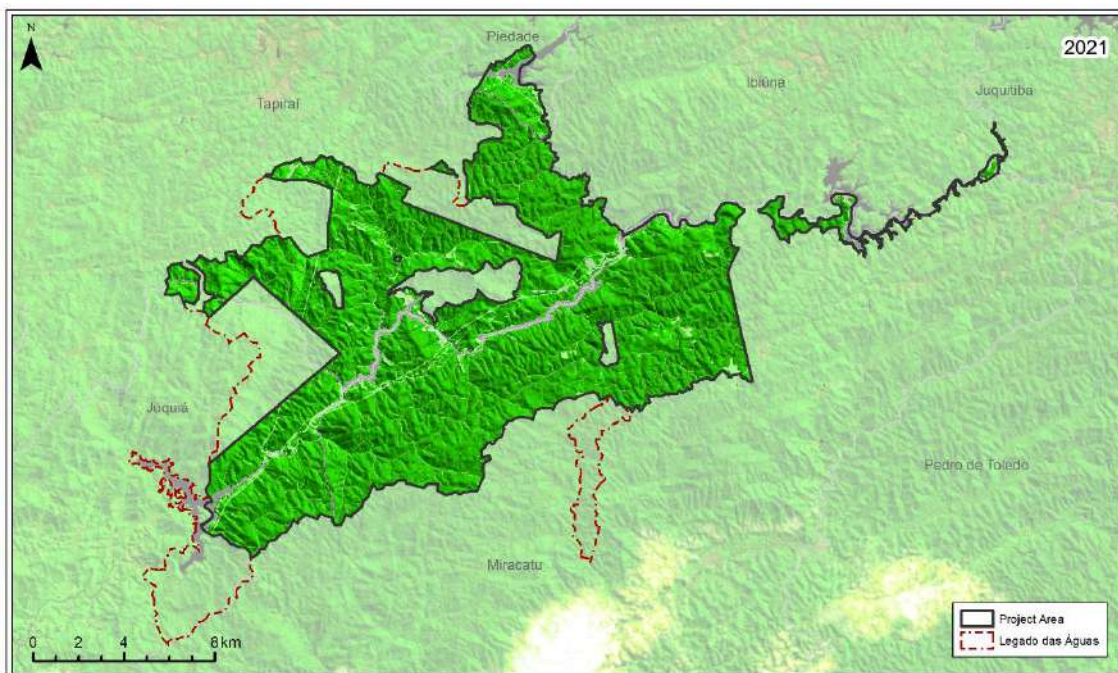
Landsat Image.

Figure 31. Vegetation cover in the Project Area, 2022.
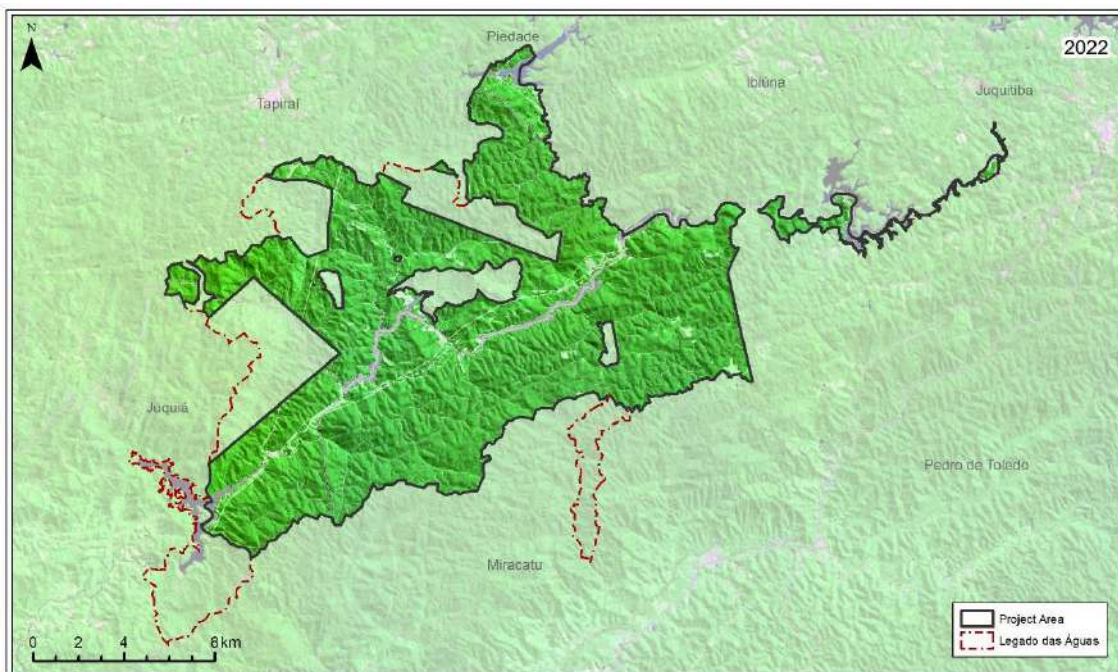
Landsat Image.

2.4.1.1. SUPERVISION AND MONITORING

Because it is a protected area and managed by Reservas Votorantim, information was obtained from the institution regarding the supervision and monitoring of the Project Area to characterize how the non-reduction of forest cover is being guaranteed, to complement the monitoring by secondary data previously presented. Monitoring mechanisms practiced in the reserve were reported to verify factors such as

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deforestation history, disturbances of fires or other forms of disturbance, change in forest cover of tree canopy, extractive activities, and other possible interferences.

Regarding boundaries, it was verified that the delimitation of the property of the Legado das Águas is established with the presence of signs and marks distributed throughout its perimeter, without fencing the area. The following photos present the signs and marks demarcating the Project Area.

Photo 1. Private Property Sign located at the end of the Santa Rita border. Coord X: 259020 Coord Y: 7327043 Zone: 23 South

Source: Reservas Votorantim (2022).

Photo 2. Private Property Sign located on the road known locally as "Jipeiro". Coord X: 264084 Coord Y: 7335129 Zone: 23 South

Source: Reservas Votorantim (2023).

Photo 3. Private Property Sign located on a border locally known as an "ecological landmark". Coord X: 244730 Coord Y: 7341304 Zone: 23 South.

Source: Reservas Votorantim (2022).

Photo 4. Private Property Sign located at TPR 188- Gumercindo Alves da silva, Núcleo Tapiraí. Coord X: 246962 Coord Y: 7343490 Zone: 23 South.

Source: Reservas Votorantim (2023).

Photo 5. Private Property Sign located on the border known as "Chuchu". Coord X: 240557 Coord Y: 7340024 Zone: 23 South.

Photo 6. Private Property Sign located in the sawmill area (km11). Coord X: 239785 Coord Y: 7325443 Zone: 23 South.

Source: Reservas Votorantim (2022).

Source: Reservas Votorantim (2023).

Photo 7. Private Property Sign located on an old ranch (land point-01, Alecrim village). Coord X: 246369 Coord Y: 7340792 Zone: 23 South.

Photo 8. Private Property Sign located at the beginning of TPR-142, Benjamin Pinto de Moraes Road, in direction of Vila Verde. Coord X: 250747 Coord Y: 7340400 Zone: 23 South

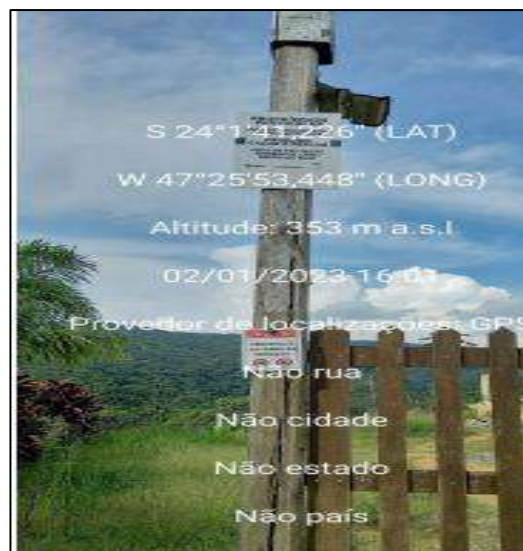Source: Reservas Votorantim (2022).

Source: Reservas Votorantim (2023).

Photo 9. Private Property Sign located on the trail known as "cerelinho" Tapiraí nucleus. Coord X: 248603 Coord Y: 7344326 Zone: 23 South.

Photo 10. Private Property Sign located in the old Núcleo Alecrim research base, TPR-142, Benjamin Pinto de Moraes Road, Vila Verde. Coord X: 250747 Coord Y: 7340400 Zone: 23 South.

Source: Reservas Votorantim (2022).

Source: Reservas Votorantim (2023).

The surroundings of the property also have periodic surveillance patrols and removal of small bushes and plants. The patrol and patrimonial monitoring of the property is made round-the-clock, in shifts, with the employment of two teams composed of a leader and 3 agents. The patrols are supported by two land mobile bases and are carried out by land routes through the trails, motorcycle patrols and boat routes around the dams. In addition to the ground patrol, the property performs inspections by drone. The periodic removal of small bushes and plants, which support the delimitation of the land, is done with a team of 3 people.

Reservas Votorantim also reported having a partnership with the teams of the Jurupará State Park for monitoring actions on the northeastern border of the Legado. As well as with the Environmental Military Police to deal with more conflictual areas in relation to villages and local communities.

The table below presents details of the team engaged in the *on-site* monitoring on the date of this monitoring event.

Table 41. List of monitoring teams of the Legado das Águas.

Name	Current Job Title	Work schedule	Sector	City of residence
ANDRE MARIANO DA SILVA	MONIT AG - DAY	12x36	Team 02-NUCLEO TAPIRAI	BAIRRO DOS MONOS
EVERTON BUENO RAMOS	MONIT AG - DAY	12x36	Team 01-FUMAÇA	BAIRRO DO MONOS

| Team	MONIT AG - DAY	12x36	Team 02-NUCLEO TAPIRAI	BARNABES
GEOVANE SANTOS DA SILVA	ADM Assistant - Day	Monday - Friday (08:00 - 17:00)	Office PORTO RASO	VILA DA FUMAÇA
GILHIARD DA SILVA	MONIT AG - DAY	12x36	Team 01-FUMAÇA	BAIRRO DO MONOS
MARCIO LUIZ LOPES	Cutter Operator - Day	Monday - Friday (08:00 - 17:00)	Plant removal	BARNABES
MAYCON LOPES DE MELLO	Leader	12x36	Team 02-NUCLEO TAPIRAI	BARNABES
MIQUEIAS PEREIRA SOARES	Leader	12x36	Team 01-FUMAÇA	BARNABES
REDENIR BATISTA	MONIT AG - DAY	12x36	Team 01-FUMAÇA	BARNABES
GEOVANE DA SILVA	MONIT AG - DAY	12x36	Team 02-NUCLEO TAPIRAI	BAIRRO DOS MONOS
JOÃO RODRIGUES DE JESUS	Cutter Operator - Day	Monday - Friday (08:00 - 17:00)	Plant removal	BAIRRO DOS MONOS
ASSARIEL LAUREANO DA SILVA	Cutter Operator - Day	Monday - Friday (08:00 - 17:00)	Plant removal	BAIRRO DO MONOS
CRISTIANO GARCIA DE SOUZA	Controller - Day	12x36	Mobile Base 2	TAPIRAI
GUSTAVO GUILHERME NATAL DOS SANTOS	Controller - Night	12x36	Mobile Base 2	TAPIRAI
ROBSON DE PAULA ANHAIA	Controller - Night	12x36	Mobile Base 2	TAPIRAI
RONEY ALEXANDRE MORAES DE S. FARIAS	Controller - Night	12x36	Mobile Base 2	TAPIRAI
ANTONIO LUCAS DE SOUZA DOS SANTOS	Motorcycle AG - Day	12x36	MOTORCYCLE-02-NUCLEO TAPIRAI	TAPIRAÍ
OSVALDO TADEU TEIXEIRA	Motorcycle AG - Day	12x36	MOTORCYCLE - 02-NUCLEO TAPIRAI	TAPIRAÍ
ALYSSON ROBERTO DA SILVA GALDINO	Motorcycle AG - Night	12x36	MOTORCYCLE - 02-NUCLEO TAPIRAI	BARNABES
LUCAS APARECIDO AGUIAR DE JESUS	Motorcycle AG - Night	12x36	MOTORCYCLE - 02-NUCLEO TAPIRAI	BARNABES
ADRIANO SOARES BORBA	Controller - Night	12x36	Mobile Base 1	ENGANO MIRACATU
NEY APARECIDO MARCELINO DA SILVA	Controller - Night	12x36	Mobile Base 1	JUQUITIBA
PLINIO ALGUSTO ANATOLY CARREIRO	Controller - Day	12x36	Mobile Base 1	JUQUITIBA
EDVALDO DA SILVA	Controller - Day	12x36	Mobile Base 1	JUQUITIBA

JAIRO LUCAS DE SALLES	Controller - Day	12X36	FUMAÇA GATE -P1	BARNABES
MOISES ALVES DE OLIVEIRA	Controller - Day	12X36	FUMAÇA GATE -P1	BARNABES
DIEGO SOARES DO CARMO	Controller - Night	12X36	FUMAÇA GATE -P1	JUQUITIBA
ANDERSON MAYCON DA SILVA	Controller - Night	12X36	FUMAÇA GATE -P1	BARNABES
MATHEUS SANTOS DE FRANÇA	Controller - Day	12X36	PORTO RASO GATE-P2	JUQUITIBA
GERALDINO DA SILVA	Controller - Day	12X36	PORTO RASO GATE -P2	BARNABES
ADIEL LAUREANO DA SILVA	Controller - Night	12X36	PORTO RASO GATE -P2	BAIRRO DOS MONOS
GUILHERME MENDES PEREIRA	Controller - Night	12X36	PORTO RASO GATE -P2	BARNABES
DAIRO ALVES FERREIRA	Controller - Day	3X3	NUCLEO TAPIRAI GATE - P3	TAPIRAI
LAURO SANTOS DA SILVA	Controller - Day	3X3	NUCLEO TAPIRAI GATE - P3	JUQUIA
JEANDERSON MATHEUS DE MORAES SANCHES	Controller - Night	3X3	NUCLEO TAPIRAI GATE - P3	TAPIRAI
JESSÉ PEREIRA SANTOS	Controller - Night	3X3	NUCLEO TAPIRAI GATE - P3	TAPIRAI
ODAIR SANTOS DA SILVA	Controller - Night	12X36	Front desk	JUQUITIBA
ANDRE SOARES GOSMES DE OLIVEIRA	Controller - Night	12X36	Front desk	BARNABES

According to information from the monitoring team, Legado has been in the process of developing a WebGis platform since 2022 to support the management and planning of local monitoring. In the future, there will be training for monitoring agents to feed the system. Currently, the platform is for internal and management use, providing data such as heat maps, hunting alert points, illegal palm heart extraction warning points, *trap* camera points for wildlife monitoring, base location points and others.
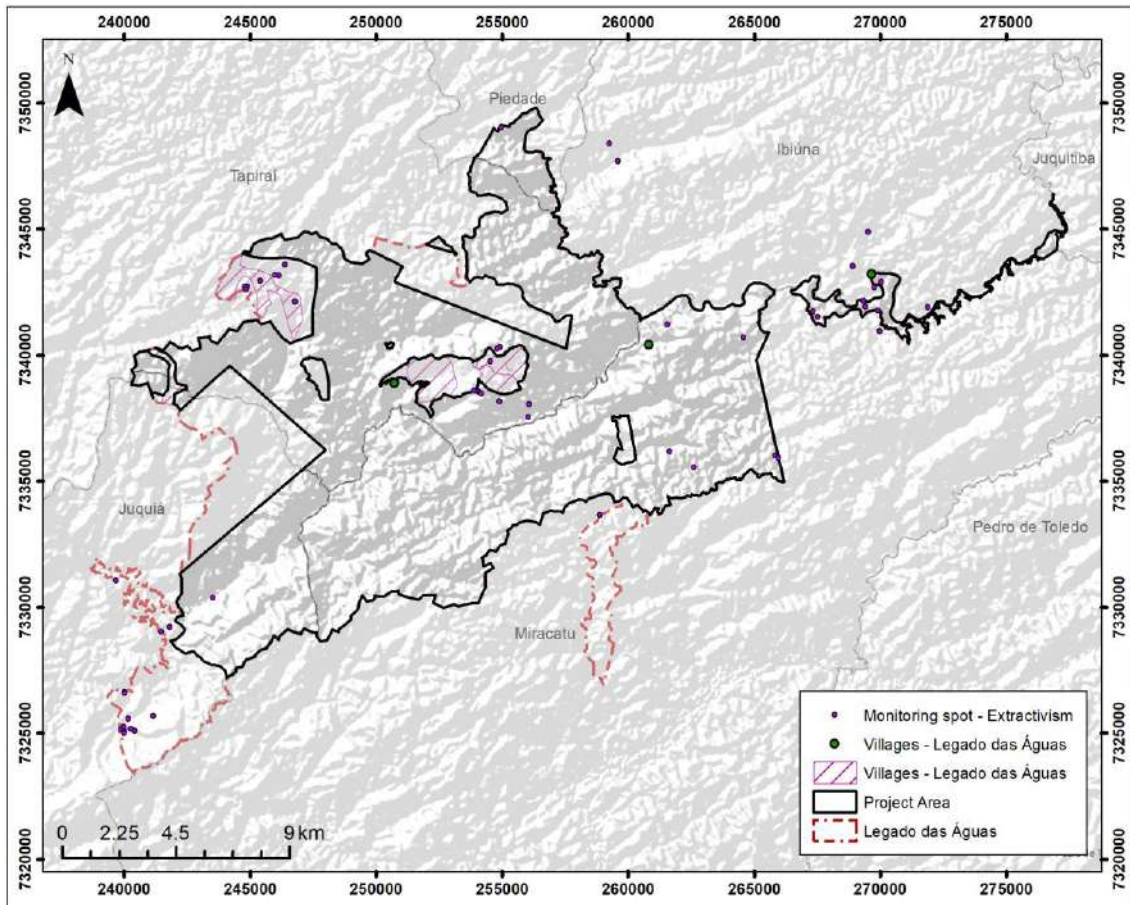
The figures below show the results obtained on the platform under development for the year 2022.

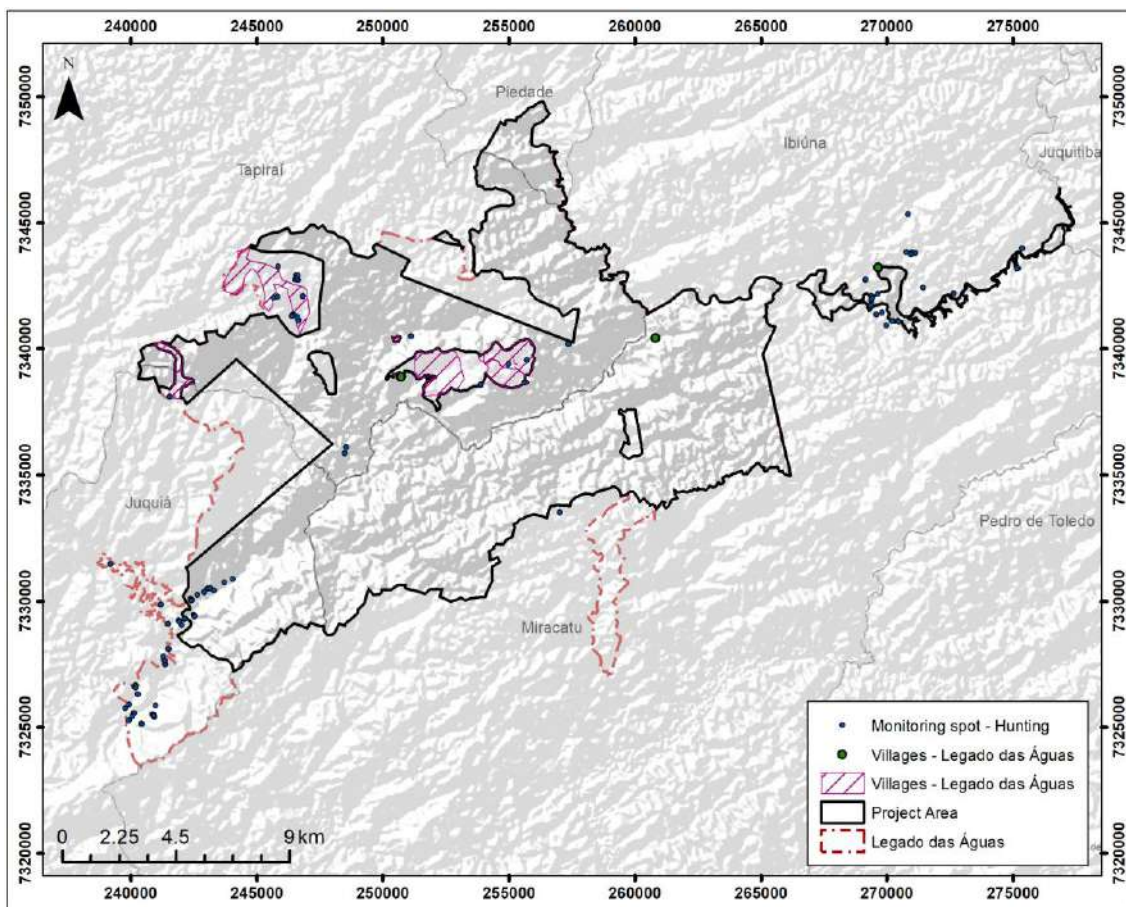Figure 32. Land tenure Monitoring Points – Legado das Águas.
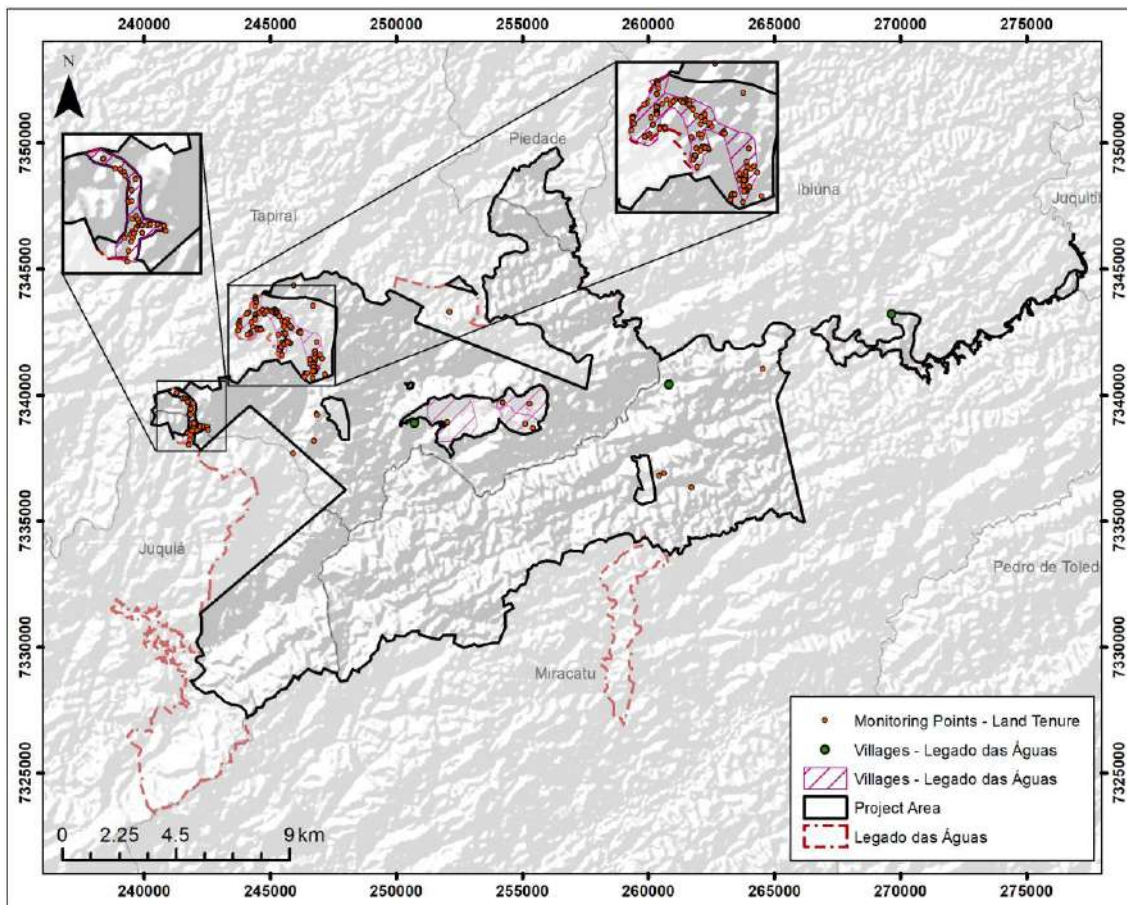
Source: Reservas Votorantim.

Figure 33. Extractivism Monitoring Points – Legado das Águas.

Source: Reservas Votorantim.

Figure 34. Hunting Monitoring Points – Legado das Águas

Source: Reservas Votorantim.

According to the information provided by the Forest Monitoring Agents or administrators of Reservas Votorantim, such occurrences, monitored and presented in the three figures above, are addressed daily with the support of the Environmental Military Police and with the relationship with the community, so that these issues are resolved, and external actions do not interfere with the conservation of the Legado das Águas.

Therefore, it is considered that there was absence of significant natural disturbance in the Project Area during the period from 2017 to 2023. Likewise, the analyses carried out in line with the Carbonflor methodology point to the maintenance of the vegetation cover during the analyzed period (2017 to 2023). Thus, there is no evidence of natural disturbance, logging, or reduction of forest area in the Project Area during the present monitoring period.

2.4.2. ENVIRONMENTAL RESEARCH AND EDUCATION

Environmental education is considered a priority in the Project Area. Legado das Águas offers several itineraries for environmental education activities, chaired by a team of trained professionals, in addition to having an inn, auditorium and restaurant structure to receive families, schools and institutions that want to promote unique experiences in the forest.

In the axes of social action and environmental education, more than 40 thousand people have already benefited, directly and indirectly, with actions to support public

management, promotion of the local economy and socioeconomic development carried out by the Legado in the territory in which it is inserted.

Thus, environmental education can be considered an important tool for the conservation of ecosystems, beyond the Legado das Águas, acting in the dissemination of knowledge and awareness of society regarding environmental issues.

Reservas Votorantim made available its Portfolio of Socio-Environmental Education held from 2017 to 2022, totaling 461 events, lectures and actions, carried out in 10 municipalities such as Tapiraí, Miracatu, Juquiá, Registro, Juquitiba, Pilar do Sul, Piedade, Ibiúna, Alumínio and São Paulo.

The public involved included Votorantim employees, students from municipal, state and technical schools, the traditional community Ribeirão da Anta and the community of the municipalities. In total, more than 64 thousand people were benefited.

The publicity occurred through approximately 122 disclosures in local media, such as newspapers and websites. Partnerships were formed with municipalities (departments of education, environment, tourism), schools, researchers from various universities and institutes.

The table below presents the environmental education events and the respective topics addressed at the meetings.

Table 42. Socio-environmental Education carried out by Reservas Votorantim.

Year of the Event	Event	Topic
2017	SDG-related events	
	Commemorative Dates of the environmental calendar	World Water Day, Biodiversity and Atlantic Forest Day, Environment Day and Arbor Day
	Water Use Awareness Week	World Water Day
	1st Environment Symposium	Environment Day
	Lecture	Environment Day
	Training	Ophidia: Field Care and First Aid
	Lecture	Snakes of the Atlantic Forest
	Lecture	Waste and PGRS (Solid Waste Management Program)
	Lecture	Ophidia, Atlantic Forest Snakes and First Aid
	School Conference for the Environment	Snakes of the Atlantic Forest
	Lecture	Selective waste collection
	Creation of the project and Inauguration of the Sensory Garden	Accessibility
2018	SDG-related events	
	Planting in the city	Anniversary of the municipality (Tapiraí)
	Water Day	Water Day

| Year of the Event	Event	Topic
2019	Commemorative dates of the environmental calendar	World Water Day, Biodiversity and Atlantic Forest Day, Environment Day and Arbor Day
	Lecture at ETEC	Environment Day
	Training	Composting and vermicomposting
	1st Environment Symposium	Environment Day
	Lecture	Poisonous Animals and First Aid
	Training	Poisonous Animals and First Aid
2019	SDG-related events	
	Lecture	Selective waste collection
	Commemorative dates of the environmental calendar	World Water Day, Biodiversity and Atlantic Forest Day, Environment Day and Arbor Day
	Lecture	International Tapir's Day
	Salvando Vidas Project [Saving Lives Project]	Day of the Atlantic Forest and Biodiversity
	Commemorative dates of the environmental calendar	Biodiversity and Atlantic Forest Day, Environment Day and Arbor Day
	1st Environment Symposium	Environment Day
	Training	Poisonous animals and first aid
	Lecture	Smoking and Alcoholism
	Tourism and Hospitality Week/Tree Week	Arbor Day
	Planting	Arbor Day
	Lecture	Women's October [Breast Cancer Awareness Month]
	Lecture	Men's November [Men's health Awareness Month]
2020	SDG-related events	
	Exhibition	World Water Day and Zoo Anniversary
	Elaboration of the educational comic book	World Water Day
	Online lecture	Environment Month
	Configuring environmental education packages	Project "Family and Nature"
	Training	Venomous animals
	Lectures, dynamics and vaccination campaign	SDG 03 Health and Well-being
	Exhibition	SDG 15 The importance of conservation for terrestrial life
	Training	SDG 15 The importance of conservation for terrestrial life
	Contest "A Creative Legado"	SDG 15 The importance of conservation for terrestrial life
	SDG-related events	

Year of the Event	Event	Topic
2021	Handbook Elaboration	SDG 15 The importance of conservation for terrestrial life
	Elaboration of the Aiga and Geo notepad	Elaboration of the notepad for delivery during environmental education actions, following the same layout of the comic book
	Contest "Water is life"	SDG 15 The importance of conservation for terrestrial life
	Programa Guardiões [Guardians Program]	SDG 15 The importance of conservation for terrestrial life
	Expedição Mirim [Junior Expedition]	SDG 15 The importance of conservation for terrestrial life
	Lecture	SDG 15 The importance of conservation for terrestrial life
	Lecture	SDG 15 The importance of conservation for terrestrial life
	Live Environment Week	SDG 15 The importance of conservation for terrestrial life
	Biodiversity of the Atlantic Forest Lecture - Environment Week	SDG 15 The importance of conservation for terrestrial life
	Biodiversity of the Atlantic Forest Lecture - Environment Week	SDG 15 The importance of conservation for terrestrial life
	Animals and Nature Day	SDG 15 The importance of conservation for terrestrial life
	Jaguar Day	SDG 15 The importance of conservation for terrestrial life
	Live Vertente Litorânea [Coastal Strand]	SDG 15 The importance of conservation for terrestrial life
2022	SDG-related events	
	World Water Day Week	SDG 15 The importance of conservation for terrestrial life
	Atlantic Forest and Biodiversity Week	SDG 15 The importance of conservation for terrestrial life
	Environment Week	SDG 15 The importance of conservation for terrestrial life
	Atlantic Forest Apprentices Project	SDG 15 The importance of conservation for terrestrial life
	Expedição Mirim [Junior Expedition]	SDG 15 The importance of conservation for terrestrial life
	Guardiões da Mata Atlântica [Guardians of the Atlantic Forest]	SDG 15 The importance of conservation for terrestrial life
	Environmental education with invested companies	SDG 15 The importance of conservation for terrestrial life
	Guardians of the Atlantic Forest Material	SDG 15 The importance of conservation for terrestrial life
	Study of the Environment	SDG 15 The importance of conservation for terrestrial life

2.4.3. RISK OF LOSS

Because it concentrates most of the Brazilian population, approximately 70% of the population (IBGE[55]), the Atlantic Forest is a highly altered biome, currently having about 12.4% of the original vegetation cover, according to the "Atlas dos Remanescentes Florestais da Mata Atlântica de 2020" [Atlas of Forest Remnants of the Atlantic Forest of 2020][56] The following graph shows the evolution of the annual rate of deforestation in the biome, in the period from 1985 to 2020, according to the mapping of the "Atlas dos Remanescentes Florestais da Mata Atlântica", which takes into account all the most mature fragments above three hectares with closed canopy or without detectable degradation by satellite images.

Figure 35. Deforestation rate in the Atlantic Forest (1985-2020).
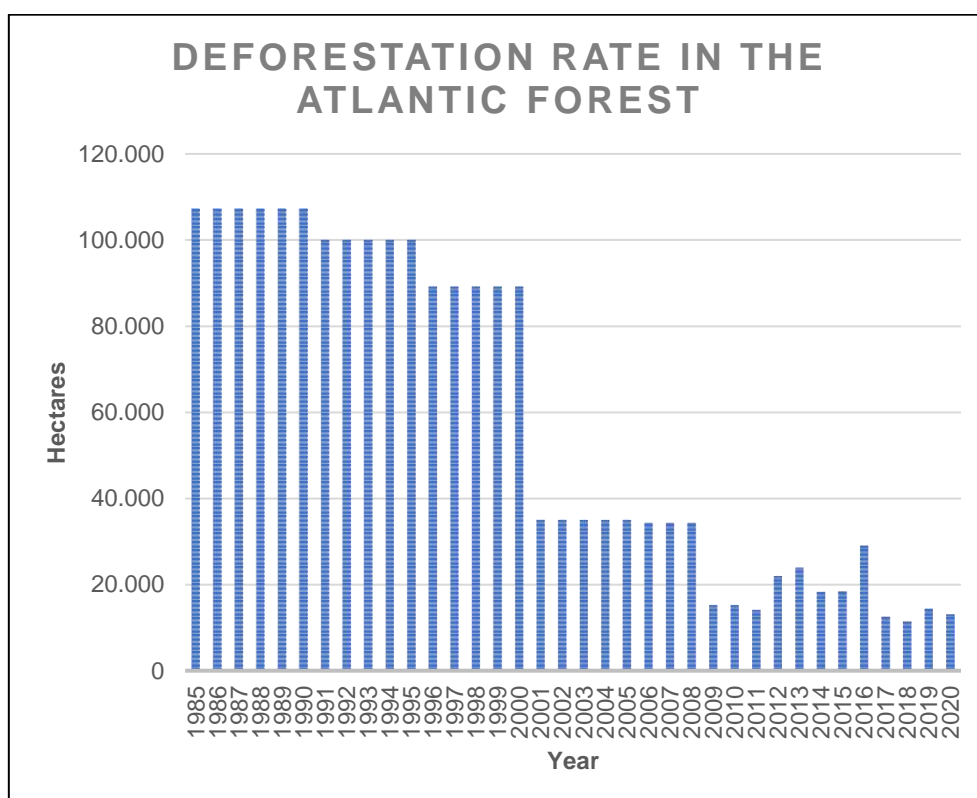
Source: SOS Mata Atlântica/INPE.

In addition, constant urban growth can be identified around the Serra do Mar region (Daunt *et al.*, 2021), which can act as an important factor in the degradation of ecosystems. Thus, although located in a region of continuous conserved Atlantic Forest, the Project Area is subject to external pressures linked to urban growth, which may threaten the areas destined to the conservation of forests over time, and, consequently, impact the future of the biome in the region.

In this region, threats to forest resources are also present through poaching and the illegal removal of floristic and edible species, directed to illegal trade. The action of poachers or palm trees harvesters entails the use of fire and the opening of trails in the

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[55] Available at: https://brasilemsintese.ibge.gov.br/territorio/densidade-demografica.html
[56] Available at: https://cms.sosma.org.br/wp-content/uploads/2021/05/SOSMA_Atlas-da-Mata-Atlantica_2019-2020.pdf

middle of the forests, also increasing the degradation of soil and water resources and the fragility of ecosystems.

Considering the various agents of environmental disturbances that can act in an uncontrolled way in the region, the assessment of the Risk of Losses consists of observing what would be the possibility that external pressures or management decisions of the Legado itself could alter the land use in the region, thus losing the native vegetation. And determine, based on the area's history, the main risks and threats of the Project Area.

Through the verification of the monitoring of the area and the environmental services provided, no disturbance actions on the local native vegetation were identified, keeping the conservation of the area constant during the monitoring period. It is noteworthy, in this sense, that the owner has no intention of generating deforestation or forest degradation, but rather using the site for conservation and sustainable use, in addition to promoting environmental education and contributing to the maintenance of the ecosystem.

After this analysis, the Risk of Loss of the project in this first monitoring period was considered as zero, without identification of fire, deforestation, illegal logging or forest degradation.

2.5. SAFETY RESERVE

The Methodology determines that a Safety Reserve must be established, which corresponds to a percentage of C+ of the Project Area that is determined according to the Valuation Period adopted, which in this case is a period of 100 years. Thus, according to the methodological calculation, the Safety Reserve carbon stock registered in the Project Area (as indicated in Table 22), which is equivalent to 1,977,985 $tCO_{2e.}$

Thus, it is possible to obtain the final value of Marketable Carbon for this project and for the consequent issuance of C+, through the expression:

Equation 3. Calculation of Marketable Carbon (total)

$$Marketable\ Carbon\ (total) = Stored\ Carbon\ (post\ loss) - Safety\ Reserve$$

The value of Marketable Carbon is therefore equal to 17,801,869 tCO2e.

2.6. CONVERSION TO C+

As established by the Methodology, the calculation of C+ considered the following equation:

Equation 4. Equation for converting EcS to C+.

$$C{+} = \frac{Marketable\ Carbon\ (total)}{100}\ x\ EcS\ Matrix\ [\%]\ x\ Degrad.proj.CC\ [\%]$$

Where:

Table 43. Parameters for the conversion to carbon equation.

$C+$	=	Number of carbon credits generated annually by the project during its period that can be up to 100 years; tCO2e
Marketable Carbon ($total$)	=	Marketable Carbon Stock (total) of the Project Area to be converted into C+ [tCO2e], value estimated in item 2.5.
EcS Matrix [%]	=	Score calculated in item 2.3.
Degrad. proj. CC[%]	=	Estimated data of the difference in forest cover between realistic and trend scenario for 2100.

Applying in the above equation the values of Marketable Carbon (calculated in the item 2.5), Matrix of Ecosystem Indicators (calculated in item 2.3) and Degradation Factor (determined in the Methodology as 10%) we have:

Equation 5. C+ Calculation.

$$C+ = \frac{17,801,869}{100} \ x \ 0.9586 \ x \ 0.1$$

This way, we determined that 17,064 C+ can be traded per year (tCO$_2$e.year^{-1}). Considering the monitoring period (Dec. 8th, 2017 to May 31st, 2023), the amount proportional to this period would be 93,410 tCO2e.

2.7. FINAL ESTIMATES

Considering the carbon stock contained in the native vegetation of the Legado das Águas, with the respective methodological deductions and following the Methodology rigorously, we present, in the following table, the final stock considered, and the respective carbon credits generated in the years of the present monitoring period.

Table 44. Estimation of C+ in the Project Area in the monitoring period.

Year	C+
Dec/17	1,029
2018	17,064
2019	17,064
2020	17.064
2021	17,064
2022	17,064
2023	7,060
Total RMCMR	**93,410**

2.8. METHODOLOGY DEVIATION

There was no deviation from the Methodology in this report.

2.9. CONCLUSIONS

In this report we verify that the criteria of the methodology have been met in their integrity and that any adjustments that need to be made are being made. Thus, PSA Carbonflor will be able to issue the following credits (C+) according to each year.

Table 45. Issuance of C+ in the Project Area of Legado das Águas in the monitoring period.

Year	Number of Marketable C+	Numbering
A2017	1,029	LdA-0001 to LdA-1.029
A2018	17,064	LdA-1.030 to LdA-18.093
A2019	17,064	LdA-18.094 to LdA-35.157
A2020	17.064	LdA-35.158 to LdA-52.221
A2021	17,064	LdA-52.222 to LdA-69.285
A2022	17,064	LdA-69.286 to LdA-86.349
A2023	7,060	LdA-86.350 to LdA-93.409

EXPEDIENT

São Paulo, August 20 de September de 2023

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ANNEX II: PROJECT AREA DATA

SUMMARY TABLE	
Property name	Legado das Águas
Landowner	Reservas Votorantim
Total Extent - Project Area (in ha)	23,988,9
Area of Native Vegetation (in ha)	21,745,4
Municipalities/State of São Paulo	Juquiá, Juquitiba, Miracatu, Piedade e Tapiraí
Biome	Atlantic Forest
Phytophysiognomy(s)	Dense Ombrophilous Montane Forest and Dense Ombrophilous Submontane Forest
Gross Stock of Credits	19,779,855
Safety Reserve	10% - 1,977,985
Marketable credits per year	17,064
Retroactive C+ available (5 years and 5 months)	93,410
Valuation Period	2017 a 2117