

Legado das Águas

Nursery stands out for its production for landscaping projects

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Ecotourism expands through new activities and a higher number of visitors

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The first fragrance extracted from Legado das Águas' forest is under study

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Strengthening of social initiatives in synergy with SDG

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cover

Maysa Santoro, biologist and environmentalist, works as an environmental educator dedicated to environmental conservation causes in wildlife rescue NGOs in Brazil and South Africa. She also provides advisory services to companies, generating content to encourage people's awareness and valuing of the environment.

Photo: Andrei Pires

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Consolidation of business fronts

Since its inception almost ten years ago, Legado das Águas' strategic plan envisaged investments in ecotourism and the opening of the Reserve for anyone who wanted to visit. That plan came to life in April 2019, when we secured the necessary structure to welcome visitors from Tuesday to Sunday, without the need for advanced booking. Ecotourism is not only an important revenue source, but it also allows presenting the Atlantic Forest in its entirety and excellent conservation status to a larger number of people.

We have always defended the idea that awareness leads to conservation. Visiting Legado das Águas raises awareness about the importance of that biome, whether for merely contemplating its wonders, following the trails, or realizing the business opportunities offered by the standing forest. We reinforced several business fronts in 2019 and have been materializing the vision that it is possible to generate jobs and income, while promoting the development of the territory and the community thanks to - and not in spite of - the conservation of the forest.

The forest has also contributed providing advances in biotechnology, which include the development of essential oils from plants with great aroma potential for the perfume industry. The first fragrance made from extracts obtained in Legado das Águas' forest is under study for subsequent market commercialization.

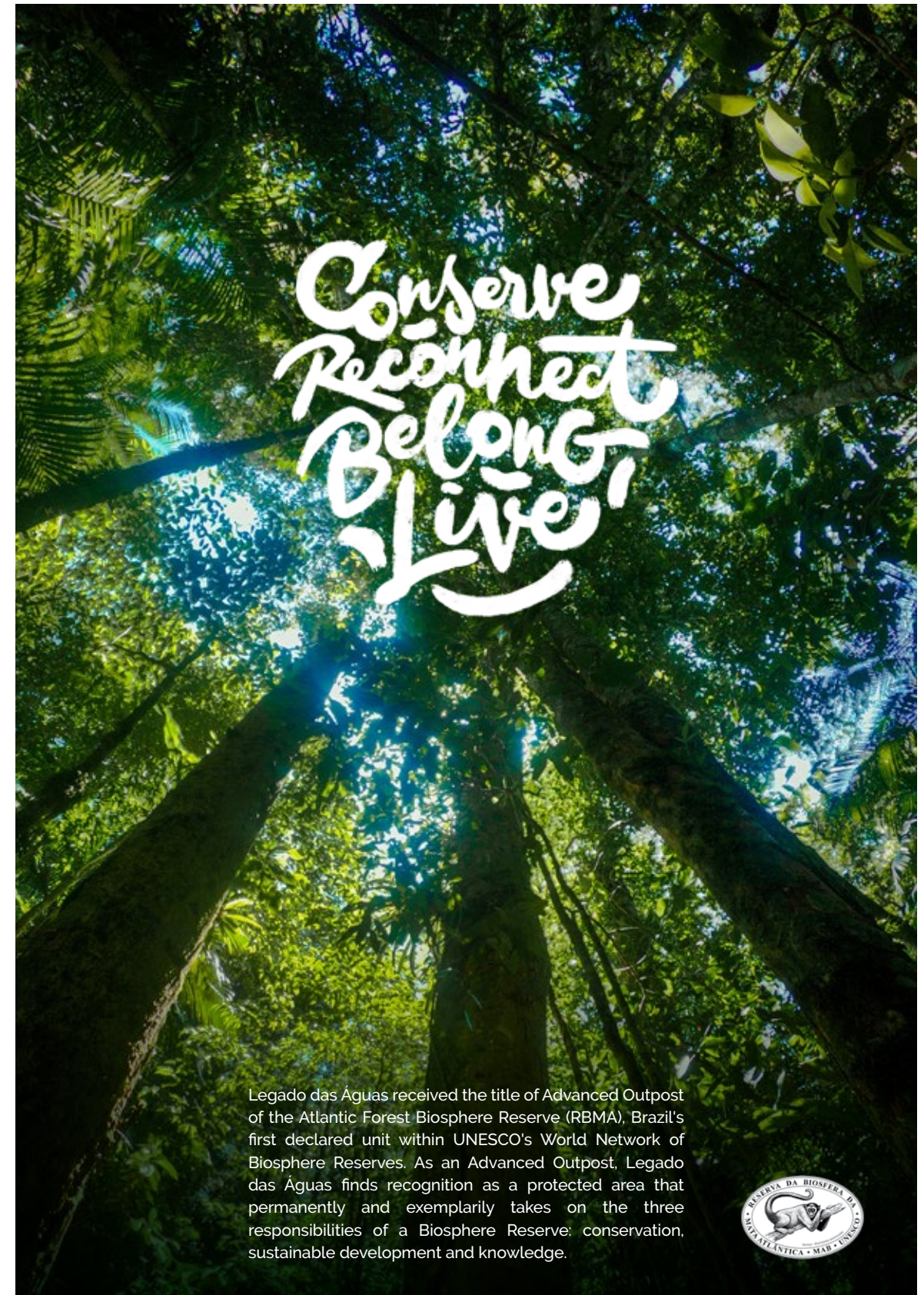
We foresee the same outcome for the first seedlings of a very rare orchid species. Previously considered extinct in the wild, a specimen was found at Legado das Águas and reproduced in our orchidarium.

The nursery expanded its production of native species focused on landscaping projects, an initiative that proved to be a promising business. More and more landscapers have been choosing to use Atlantic Forest ornamental plants in their projects in a quest to add elements of that biome's original landscape to urban centers. The nursery's plants also enriched *Pomar Urbano* (Urban Orchard), a large project aimed at replenishing green areas along the Pinheiros River, in the city of São Paulo.

São Paulo capital also gained *Pátio Caeté* (Caeté Yard), a space that as of 2020 will operate as a logistics center for the nursery, as well as serve as visitation and plant sale center. This will be another step towards accomplishing our goal to reconnect the cities with the Atlantic Forest, and their inhabitants with nature.

In accordance with Legado das Águas' strategic plan, the Reserve's operations should be fully dedicated to finance the conservation of the forest. The year 2019 brought major advances to this end. We expect our business fronts to be in full operation in the upcoming years, generating shared value and promoting land development.

David Canassa,
director at Reservas Votorantim



Legado das Águas received the title of Advanced Outpost of the Atlantic Forest Biosphere Reserve (RBMA), Brazil's first declared unit within UNESCO's World Network of Biosphere Reserves. As an Advanced Outpost, Legado das Águas finds recognition as a protected area that permanently and exemplarily takes on the three responsibilities of a Biosphere Reserve: conservation, sustainable development and knowledge.

2019 facts may

We present here the 2019 highlights at Legado das Águas

Workshop and launch of new cycling trail

The **I Legado das Águas: Cycling, Adventure and Nature Trail Workshop** marked the inauguration of the Reserve's new mountain bike trail, which runs along approximately 40 kilometers of dirt roads flanked by the forest. The event began with a brainstorming between sector professionals and bike lovers. The most striking part of the event was the lecture by Arthur Simões, who reported his adventure cycling through 46 countries on five continents for more than three years. A Shimano Brazil representative talked about electric mountain bikes, a new global trend in the sector. At the end, participants cycled for about 15 kilometers of the new trail.

"Events like these promote and encourage visitation, adding the trail to the calendar options for bikers from all over the country," declared William Mendes de Souza, manager of Public Use, Ecotourism and Sports at Legado das Águas. "Our idea is to hold the meetings on a yearly basis, discussing current topics that are relevant to cycling."



Legado das Águas' research at a world congress

The **International Orchid Conservation Congress**, the sector's most prominent event, held its seventh edition in 2019 at Kew Gardens, the Royal Botanic Gardens, in London. It was the first time the Congress invited a Brazilian researcher to speak at the plenary session. Biologist Luciano Zandoná, responsible for Legado das Águas' orchid research and conservation project, gave a lecture on global illegal trade of orchids representing the IUCN Orchid Specialist Group. Moreover, two research projects developed at Legado das Águas were accepted for oral presentation at the Congress: "Strategies for the conservation of Atlantic Forest orchids at Legado das Águas" and "Rediscovery and conservation of the rare *Octomeria estrellensis* and production of seedlings with traceability", both authored by Luciano Zandoná, Angelica Maragni, Miguel Flores and Frineia Rezende.



"It was an opportunity to show that our work at Legado das Águas shares the same quality standard as those being conducted in developed countries," said Luciano Zandoná. According to him, Legado das Águas' orchidarium complies with the global goals for orchid conservation set forth in the first edition of the Congress: *in situ* conservation (rescue and return specimens to their habitat), *ex situ* conservation (maintain a living collection outside the plant's habitat, the method adopted by the orchidarium), and environmental education activities.

june Prêmio Fiesp de mérito ambiental (Fiesp environmental merit award)

Created 25 years ago by the Federation of Industries of the State of São Paulo (Fiesp), the **Fiesp Environmental Merit Award** recognizes the best sustainability initiatives in the industrial sector in three categories – Large Size, Small Size and Social Responsibility. In 2019, the award recognized Votorantim S.A. in the Social Responsibility category for the creation of the Legado das Águas Reserve.

july Innovations inspired by nature

Biomimetics is the area of science that seeks in nature innovative solutions for the development of new technologies, processes or products. Its techniques can be applied to areas as diverse as business projects, architecture, academic research and people management. In 2019, Legado das Águas hosted two events on the topic.



photo: Alessandra Araújo

august

Native plants in city landscaping

With an audience composed by landscapers and architects, the event **Landscaping with the Atlantic Forest** was held in August at Casa Tegra, in São Paulo. Frineia Rezende, executive manager at Reservas Votorantim, and Nik Sabey, a landscaper specializing in ornamental use of native plants, discussed the importance of Atlantic Forest plants in urban landscaping projects, rescuing the city's original flora. Currently, the vast majority of landscaping projects in São Paulo state capital use exotic plants, that is, plants from other biomes or even other countries. Seen as weed, Brazilian plants were not even considered for landscaping projects for decades, recalled Nik Sabey. "We want to demystify such an image and show that we have species as beautiful as, or even prettier than what you can find in any other country," said the landscaper.





A sample of Legado das Águas in São Paulo soil

Memorial da América Latina (São Paulo) hosted **Shimano Fest** in August 2019, a traditional bike sector event that brings together cycling professionals and bike lovers. At Legado das Águas' booth, visitors learned about the Reserve's ecotourism options, particularly cycling trails and activities. A glimpse of Legado das Águas' landscape can also be seen at the Mobility & Sustainability Arena, a space for lectures and debates created using plants of various native Atlantic Forest species. William Mendes, manager of Public Use, Ecotourism and Sports at Legado das Águas, gave a lecture on the new adventure-cycling trail inaugurated in May.

september

Ecotourism in environmental film festival

In September, we held Espírito Santo National Environmental Film Festival, promoted by Cine.Ema, an environmental education platform that seeks to raise awareness through movies. The festival presented the **Community, culture and sustainability connection** seminar. One of the panels of the seminar, held at the Águia Branca Environmental Reserve, in Vargem Alta, discussed Sustainable Tourism. Frineia Rezende, executive manager of Reservas Votorantim, presented the ecotourism at Legado das Águas, showing how economic activities in the Atlantic Forest can generate benefits for companies and the community.

Training for Decathlon's store leaders

In April and September, teams of about fifteen Decathlon's store leaders from different Brazilian cities attended an outdoor training program at Legado das Águas. This event was already included in the calendar of the sporting goods store chain, but it used to be held at traditional hotels. At Legado das Águas, in addition to attending the training sessions, store leaders had the opportunity to test products and pieces of equipment.



Environmental services at the Ethos Conference

In September, David Canassa, director of Reservas Votorantim, attended the **Ethos 360° Conference, 2019 edition**, promoted in São Paulo by the Ethos Institute. The Conference brings together representatives of companies, the academic sector, civil society and the government to discuss national and global trends on sustainable development issues. Canassa was one of the four members of the panel **Feasibility of payments for environmental services**, presenting Legado das Águas' various areas of activity and showing how it is possible to generate revenue while preserving the standing forest.

november

An orchid for a Princess

In honor of the 90th anniversary of the birth of Princess Grace of Monaco (1929-1982), the event **Princess Grace Forever** was held in Monaco on November 5, 2019. The event offered a glimpse into Legado das Águas – a seedling of the very rare orchid *Octomeria estrellensis*, previously considered extinct in the wild, but which was found in the forest of the Reserve and reproduced in laboratory by researcher Luciano Zandoná. A batch of these seedlings was named "Princess Grace" as a tribute to the life of the princess, who was not only a supporter of social and environmental causes, but also a great admirer of orchids. Prince Albert II, Grace's son, received the seedling during the ceremony. "We are greatly moved by this lovely tribute to Princess Grace," said Luciana de Montigny, founder and president of the Brazil Monaco Project and responsible for handing over the gift. "The orchid conservation project developed at Legado das Águas is extremely relevant to the perpetuation of the species and fits remarkably well this occasion when we are celebrating the 90th anniversary of the princess, who loved orchids."

photo: Axel Bastello/Palais Princier



The forest in every way

On the last Saturday of November, Legado das Águas produced sounds beyond the vocalization of animals and rustling of trees in the wind. We could hear the fuss and happiness of 22 children visiting the Reserve for the first time – of whom eleven visually impaired and eleven, sighted. The tour was part of the **Natureza de Criança** (Nature of Children) program, sponsored by the company Olhar.com Todos Os Sentidos, which promotes the direct contact of children with natural environments. Part of the group is always composed of visually impaired children, promoting inclusion and interaction amongst the group. The children traveled around the trails, paddled on kayaks and swam in the river, activities that all visitors can indulge. However, one of Legado das Águas' attractions is particularly welcoming to anyone with a disability: *Jardim Sensorial* (Sensory Garden), an accessible trail with explanatory signs in braille. Spread all across the trail, there are elements of the forest that can be felt, thus awakening senses such as touch and smell, promoting an immersion in the Atlantic Forest that goes far beyond what eyes can see.

december

New Years' Eve at the forest

Far from crowded beaches and the bustle of the cities, a group of tourists experienced the first New Year's Eve held at Legado das Águas. The program held from December 27 to January 3 offered a selection of Legado das Águas' traditional ecotourism activities, such as hiking or cycling trails, canoeing, and river and waterfall swims. The restaurant was specially decorated for the party on the night marking the usher in the New Year. Visitors and Legado das Águas' team enjoyed the buffet prepared by Chef Amauri Barbosa to the sound of music until dawn. "The opportunity to end a cycle and move into a new beginning in a quiet and welcoming place in the heart of the forest was a unique experience for everyone. These were days of resting and connection with nature," commented Andrei Pires, member of Legado das Águas' ecotourism team. ■



It was on the media!

REGIONAL

183 news items published
141 on websites **2** on TV
40 on printed media
media returns **R\$ 590,327.31**

NATIONAL

140 news items published
109 on websites **2** on TV
29 on printed media
total valuation **R\$ 14,377,029.64**

f
337 posts
86,126 interactions
172,945 followers
175,321 in 2018

ig
310 posts
139,137 interactions
24,341 followers
13,921 in 2018



The year of the turnover

Nursery focuses plant production on landscaping and becomes a business unit

When it was inaugurated in 2016, the nursery of Legado das Águas' native species focused on producing tree seedlings for reforestation. At the time, we imagined demand for environmental compensation projects would grow encouraged by the replenishing of forest degraded areas with native vegetation. Nevertheless, this market did not prove as promising particularly due to environmental legislation hindering. Compensation projects with the planting of seedlings of native species became rare. As the sector had prepared itself in advance by increasing seedling production, low demand and large supply caused prices to plummet.

"The path to repositioning the business laid on increasing focus on landscaping, due to the growth prospects for this market segment, which has very few qualified producers of seedlings of Atlantic Forest native plants. Many species with great market potential are not even produced," said agronomist Silas Cezar da Silva, production coordinator and technician responsible for Legado das Águas' nursery.

As of 2018, we devoted efforts to the development and implementation of protocols for plant production in tubes and pots in order to leverage production and sales. "For us, 2019 was the year of the turnover," mentioned Silva. "The nursery became a business unit – it now produces seedlings and plants in addition to its sales, transportation, delivery and provision of technical assistance operations." When it comes to specific projects, such as *Pomar Urbano* (Urban Orchard) (see page 24), the nursery's team also offers planting and technical care until the consolidation of plants.

More than expecting the market call for native species plants, the decision was meant to generate demand. The idea was brought up by landscaper Ricardo Cardim, a supporter of the use of native flora in landscaping projects, who designed projects using specimens grown in Legado das Águas' nursery. Following suite, after Legado das Águas' 1st Landscaping and Atlantic Forest Meeting, held in November 2018, we held meetings with several other landscapers interested in native plants, who exchanged experiences and information on the most suitable species for this market. This group formed the **Rede Paisagismo e Mata Atlântica** (Landscaping and Atlantic Forest Network) and released a manifesto advocating for environmental conservation and quality of life in Brazilian urban centers through sustainable landscaping by using native species of the Atlantic Forest.



An example of the positive outcome from this repositioning was the creation of **Pátio do Porto Raso** (Porto Raso Yard), where seedlings grow in more spacious containers (vases or pots) until they are larger in size, given that landscaping projects require fully grown plants and do not embrace seedlings in tubes. In fact, the larger the plants at the time of sale, the higher the added value. "Landscaping clients want their garden to be set up when delivered and, therefore, landscapers prefer buying fully grown plants," explained Silva.

Pátio do Porto Raso has capacity for 25,000 to 35,000 specimens of plants, depending on container volume and plants' desired size. Of the 144,000 units produced in 2019, 13,000 were larger size specimens, grown in containers such as vases or pots. Some of these species had never been produced or offered to the market.

Another great achievement was the creation of **Pátio Caeté**, a space in the Vila Leopoldina neighborhood, in São Paulo city, with operational startup scheduled for 2020. The space will also serve as a logistics center and an area for visitation and sale of plants produced by Legado das Águas' nursery. This initiative will streamline the contact with landscapers and their customers, as it is not everyone that can go to the nursery.

Silas Cezar da Silva understands that the main goals for 2020 should include the consolidation of the nursery as an increasingly robust business unit, offering production, sale and implementation of projects using native plants produced by Legado das Águas, benefiting from *Pátio Caeté*, in São Paulo, as a logistics, sales and production flow center. ■

LARGE-SCALE LANDSCAPING

A Votorantim former industrial shed located in the São Paulo neighborhood of Vila Leopoldina was transformed into an innovation center for companies. With capacity to house 1000 professionals, the **State**, inaugurated in late 2019, is a concrete example of the feasibility of using Atlantic Forest native flora for ornamental purposes. Many of the plants used in the State's landscaping project come from the Legado das Águas' nursery.

Signed and public commitment

Protocol between Reservas Votorantim and the state government shows how a private protected area can promote sustainable development



Since it was just an idea around 2010, Legado das Águas was planned to be a Private Reserve for Sustainable Development, reconciling Atlantic Forest conservation with economic activities, thus contributing to improve quality of life in its surroundings. The problem is that the National System of Conservation Units (SNUC) did not have a category of protected area with these characteristics at the time – and it still does not have such category. The category that more closely represents the model intended by

Legado das Águas is Private Natural Heritage Reserve (RPPN), a private conservation area created at the landowners' initiative where tourism and research activities can be carried out, but which cannot be used for commercial purposes.

The solution was proposing a model envisaging a number of self-imposed standards in the form of a **Protocol of Intentions**, established in 2012 (and revalidated in 2015) between Reservas Votorantim and the São Paulo State Government. "This Protocol defines the proposal for a territory that pursues sustainable development with several lines of operation," explained David Canassa, director of Reservas Votorantim. "In addition to guiding our activities, we want the Protocol to inspire private initiative and public management participants by showing that it is possible to preserve the forest while generating business."

Still in 2020, Reservas Votorantim will propose the Protocol's renewal for another five years. For David Canassa, the document is a way to raise public awareness about the social role of that area, also because that is a Brazilian legislation requirement. "The difference is that we are playing an unconventional social role at Legado das Águas by preserving the standing Atlantic Forest while generating businesses in production chains that add shared value, thus benefiting the company and the community," declared Canassa. ■



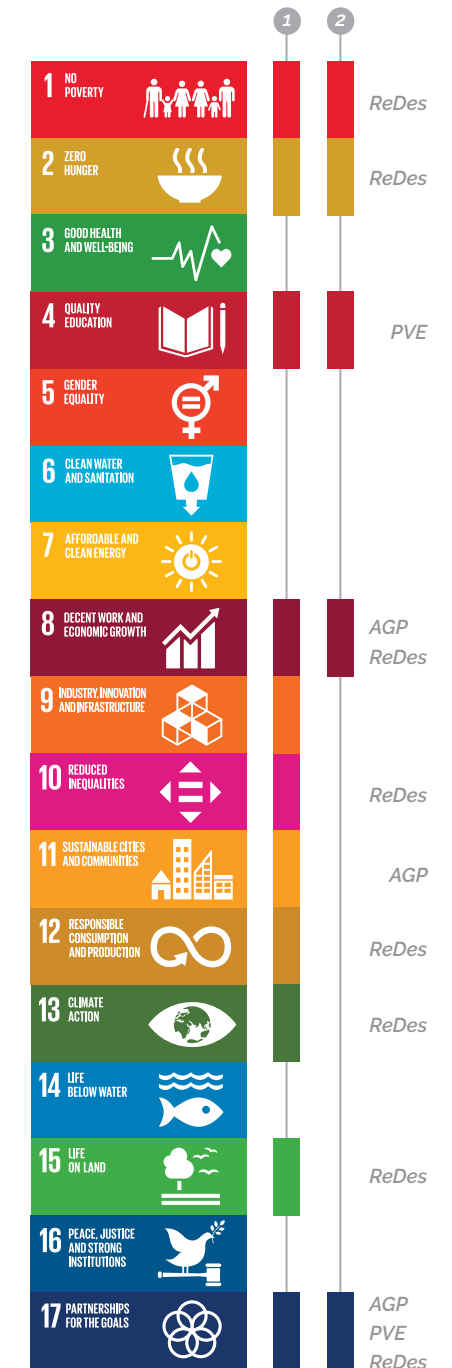
Measured advances

Social performance aligns indicators with Sustainable Development Goals (SDG)

Protecting the environment and working for sustainable development, tackling climate change, eradicating poverty, and promoting prosperity, health and well-being for human beings are complementary, not exclusionary, purposes. This summarizes the Sustainable Development Goals launched by the United Nations (UN) in 2015. They provide guidance for establishing public policies and corporate and civil society organizations' behavior until 2030.

There are 17 goals comprising 169 targets and 244 indicators. At Legado das Águas, all work fronts act together to contribute in some way with targets and indicators that impact 11 goals (see table), but our social initiatives can directly influence five of them: eradication of poverty (1), eradication of hunger and sustainable agriculture (2), quality education (4), decent work and economic growth (8) and partnerships for the implementation of the goals (17). *Learn more about our social projects on pages 34 through 37 of this report.*

Among the 244 indicators contemplated by the SDGs, 70 are monitored by the Brazilian Institute of Geography and Statistics (IBGE), providing a parameter to work with the SDGs in Brazil. "In 2019, we mapped eventual synergies between the targets and indicators of the SDGs monitored by IBGE, in comparison with the processes of each department of Legado das Águas. We reached another milestone in the social front by monitoring some indicators that are directly related to five of these goals," explained Daniela Gerdenits, Social Responsibility consultant at Reservas Votorantim. "In 2020, we intend to structure indicators that reflect the results of the departments while also contributing to the SDGs. Thus, we wish to effectively support the development of the territory in which we are inserted," added her. ■



- 1 SDG covered by Legado das Águas
- 2 SDG directly impacted by Legado das Águas' Social Initiatives



Our entire surrounding is dark when the paddling begins. Just a few lanterns light up the path across the lake. After a brief moment, lanterns are extinguished and then comes the pitch black – a distinct experience until eyes adapt to the darkness and begin to spot the sky, the stars, perceive silhouettes. Other senses awaken. The paddling continues and soon participants hear a strong sound of running water and feel an icy spray on the face. Lanterns are lit up again and only then people realize they are face to face with a waterfall.

Doors open to the public

In a year of expanding ecotourism, Legado das Águas launches new activities and extends visitation hours



Offering touches of adventure and excitement, night canoeing is one of the tourist activities launched at Legado das Águas in 2019 – a year when ecotourism flourished, marked by the opening of the Reserve to the public. People no longer have to book their visit and can purchase tickets at the entrance of Legado das Águas. The inn and restaurant also became permanently operational.

Legado das Águas is a unique place for visitors, as it combines high degree of forest conservation with a comfortable lodging structure. Activities fit various profiles of ecotourists – the Reserve offers from a relatively easy self-guided two-kilometer trail to a 23-km crossing with an overnight in the forest, in addition to water activities and wildlife sighting.



"When people leave, they have fallen in love with Legado das Águas and the experience they had of reconnecting with nature," said Marina Menezes Giusti, who works at the reception of the inn and restaurant. "They say they didn't realize there was an Atlantic Forest area with such a high degree of conservation near São Paulo."

Thanks to the improved structure to welcome tourists and the higher number and diversity of activities, we expect as many as 10,000 visitors in 2020, according to William Mendes, manager of Public Use, Ecotourism and Sports at Legado das Águas. For him, having people experiencing the forests is crucial: "public use is an auxiliary instrument in conservation, and it also generates employment and income for the local community."



THE FOREST TEACHES

Legado das Águas has been offering **Environmental Study** activities for basic education to undergraduate students since 2017. In November 2019, we held an event with the attendance of representatives of agencies and schools to show the Reserve's potential as an outdoor classroom. The tours are based on the same structure used for ecotourism activities and allow teachers to tackle various pedagogical contents in areas such as science, biology, history, geography, and astronomy, among other topics.

More than an open-air laboratory, Legado das Águas offers a unique experience, immersion in an Atlantic Forest area with high degree of conservation. Therefore, a suggested tour begins with a visit to **Jardim Sensorial (Sensory Garden)**, where children handle different types of soil and plants, awakening the senses of touch and smell. Then they follow the trails in the woods with keen perception. "It's not just a hands-on class, the experience reconnects children with nature," said Salete Vicentini, operations coordinator at Legado das Águas. ■

ECOTOURISM 2019 HIGHLIGHTS

- Visitation to **Legado das Águas** opened from Tuesday to Sunday without the need for advanced booking; tickets can be purchased at the entrances;
- Opening of the **inn and restaurant** to the general public;
- New trail **Copaíba – Prainha**, with a nine-kilometer walk and three kilometers through the water (boat or canoeing);
- New trail **Copaíba – Mirante do Sinal**, along 4.2 km;
- New **40-km cycling trail** covering the main roads of the Reserve;
- Launch of **Night Canoeing**;
- Launch of the **Astro Experience**, open-air star watching accompanied by astronomy experts.

Ideal scenario

A 31,000-hectare area covered by Atlantic Forest in excellent conservation status, rivers, waterfalls, trails and good lodging and eating structure, in addition to environmental and property safety ensured by monitors and guards. This unique set of attributes has made Legado das Águas increasingly sought after by companies, both for product launches and location for fashion editorials or TV shows.

In October, Legado das Águas was the setting for a TV show recorded during the entire month. In November, the Reserve staged the launch of the **GoPro Hero8Black and GoPro Max** cameras. Several of the company's guests tested the new cameras strolling along the trails and waterfalls, posting photos and videos on social media.

The close contact with the Atlantic Forest was also one of the highlights of the course **Plug In Plug Out: Nature-Inspired Innovation Meeting**, held at the Reserve's auditorium in September. In complement to the theoretical classes, course promoters accompanied students along the trails and took them through a visit to the orchidarium and nursery, showing how nature can inspire ideas and solutions in professional activities. ■



photo: Pepe Fiamoncini

photo: Clarissa Dartsch



Until two or three decades ago, childhood was spent outdoors, on the street, on open or empty land located on the outskirts of neighborhoods and cities. In a gradual exploration exercise, which began on the backyards of houses and expanded into open public spaces, boys and girls lived experiences that sharpened their senses, nourished their imagination and challenged their physical limits.

Childhood has changed. The natural world is becoming less and less present in children's lives and consequences are far-reaching. Obesity, hyperactivity, emotional imbalance, low motricity and myopia are some of the most patent health problems caused by this scenario, but several other less recognized factors are also at stake.

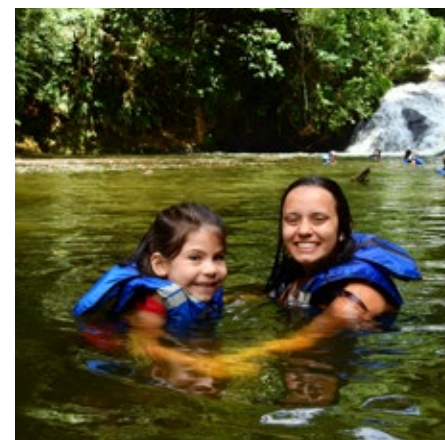
At the same time, in recent years we have seen many research projects suggesting what certain educators, parents and specialists have attested for decades: interacting with nature in childhood, especially by playing, helps foster creativity, initiative, self-confidence, as well as the ability to choose, make decisions and solve problems. Moreover, loving experiences for and with nature contribute a great deal to nature conservation, due to the connections between the feeling of belonging to the natural world and attitudes of care and respect for the Earth.

Playing in the sand, having picnics in the shade of trees, being delighted by birds singing or the beauty of flowers, taking waterfall swims, cultivating a vegetable garden are important experiences that put children face to face with the beauty and mystery of life. These experiences should be encouraged in various ways and contexts, as shown in the illustration. The image shows the effect of progressive contact with nature, in areas close to us all, a context where urban green areas play a crucial role.

For children, these green areas often mean "close nature", which will be the landscape of their childhood. It is where many learn to ride a bike, climb a tree or run. At the same time, it is essential for children to have longer experiences in areas of untouched nature at least once a year, far from human interference, where the experience in nature is guided by abundance and freedom.

Children and nature: a necessary and urgent encounter

by Lais Fleury*



At times when we are facing the challenge of digital intoxication and shopping malls have become one of the most sought leisure alternatives for families in urban centers, large remote wild areas are where children can be in contact with the wilderness, the indomitable, the unknown – and fall in love with the wonderful planet we share with so many other forms of life.

In 2019, the Brazilian Society of Pediatrics (SBP) partnered with the Children and Nature program of the Alana Institute to call upon society to restore children's contact with nature, by launching a **Guidance Manual on the Benefits of Nature for the Development of Children and Adolescents**¹.

The publication describes the several benefits of interacting with nature for children and adolescents – as well as for adults – at a historical time when we are moving further and further away from it and confining ourselves to closed and isolated spaces, suffering greatly as a result of that. Supported by scientific evidence, it shows how nature (and freely playing in this scenario) improves all the important milestones of a healthy childhood – immunity, memory, sleep, learning ability, mood, sociability and physical ability, among other aspects. At the same time, the experience can reduce or improve problems such as obesity, infections, allergies, behavioral disorders, ADHD, depression and consumerism.

Aligned with a worldwide movement that advocates for a more nature-rich childhood, the publication offers recommendations for pediatricians, families, educators, managers, as well as for children and adolescents. It contains rich support material and even a prescription model for pediatricians.

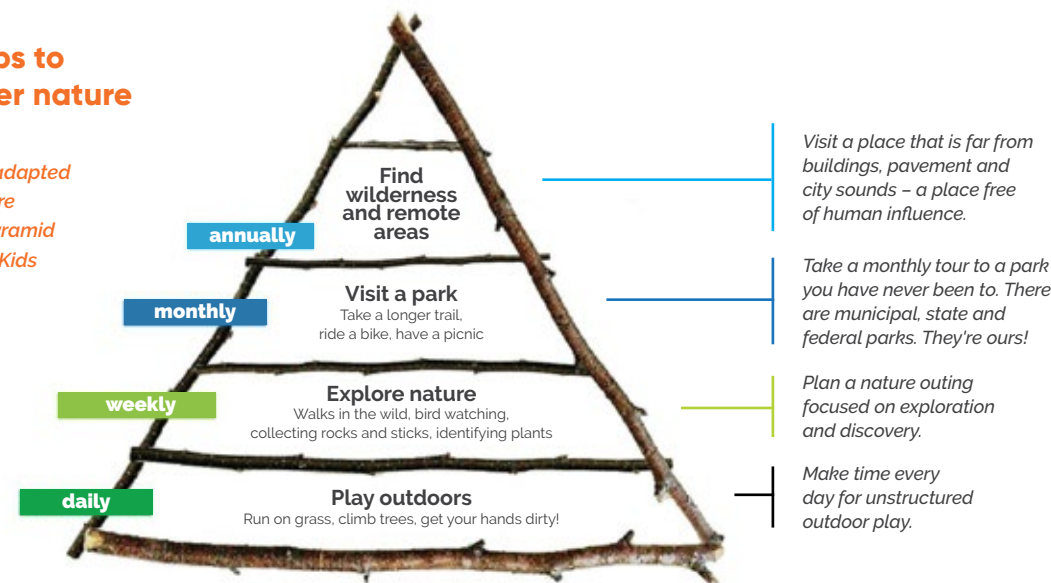
Children and adolescents need nature just like nature needs children and youngsters. We only take care of what we know. Children whose time to play and bond with nature is ensured will become healthy citizens who value the respect for all living beings, either human or not, who will contribute to the well-being of society and the health of the planet. ■

"Lais Fleury is mother to Alicia and Lia. She is co-founder of Vaga Lume Association, recognized as a social entrepreneur by Ashoka since 2003. She is currently coordinator of the Children and Nature program of the Alana Institute and has a graduate degree on "The turn and the voice of children: anthropological and poetic listening of childhoods".

¹ Available at bit.ly/manual_cen

Four steps to encounter nature

Image freely adapted from the nature connection pyramid of the Nature Kids Institute



Magnificent and native

by Nik Sabey *

According to the Judeo-Christian tradition, human beings have the mission of caring for a large garden since the Eden. It is common to associate gardens with paradises in many tales and legends. Nevertheless, where is the perfect garden? And how would the perfect garden be?

It has not been long since we, *Homo sapiens*, started gathering in large communities and created massive concrete, highly condensed urban centers. Cars, streets, overpasses and buildings voraciously took over the landscape. Due to our way of occupying these spaces, plants and animals were left aside and we set new standards for how nature should behave.

After all these changes, we are suffering from the effects of the imbalance caused by such choices. Frequent studies show that being estranged from nature causes us a number of harms such as depression, anxiety, apathy, and discouragement, among others. And what about the evils that the estrangement from nature causes animals or plants whose entire surroundings were altered?

Going back to the question of how the ideal garden would be, I believe we will never be able to create gardens and landscapes more perfect than natural landscapes. In such landscapes, harmony between elements and beings mesmerizes us. Nature has evolved in hundreds of thousands of years and created unparalleled landscapes,

insects and animals, for example. It also plays an educational role, introducing these species to the public. In addition, functional gardens require less maintenance and watering, as they are adapted to local conditions.

Translating this way of thinking to our country and cities, we notice that Brazil's vegetation is vast and offers alternatives for all landscaping project models. Seen as weed, the use of Brazilian plants was not even considered for decades. We, the landscapers, now want to demystify or "deweed" this image and show that we have species as beautiful as, or even prettier than those in any other country.

*Nik Sabey is a landscaper specializing in ornamental use of native plants.



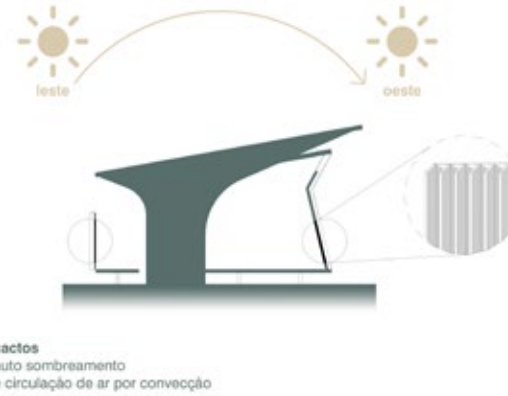
Landscaping projects take Atlantic Forest plants to urban centers

Trees had their space defined on sidewalks and gardens, having to adapt to a new manual of conduct where they were often pruned in geometric shapes completely estranged from their natural behavior. A selection of plants traveled around the globe creating a standardization of "ornamental plants" to occupy areas set aside for green pockets in the new configurations we call cities. Many of these plants have also taken on configurations created by us to fit a model that seems to go against the nature of these beings. Green walls were erected with plants pruned in geometric shapes, and we even "carved" animals using these strange pruning techniques developed for purely ornamental gardens. Plants were in the service of men.

millimetrically adapted to the conditions of where they are located in an equilibrium that embraces from the most fragile insects to drastic events such as typhoons and storms. Landscapes with canyons, mountains, lakes, waterfalls, arid deserts or dense and humid forests, rivers and streams, fields, mountain ranges and glaciers – our biomes carry the perfection of that evolution, where each being functions as a small part of a clock.

The impact from that can no longer be ignored. The native vegetation of each biome must be respected and rescued. The very few spaces set aside for green areas in our cities need to be set free from the vice of creating a purely "ornamental" garden and become a functional model. A garden with plants native to its biome is functional in many ways, thus helping preserve plant species, ▶

This field underlines the importance of works such as that being developed by Legado das Águas' nursery. Our estrangement is so wide and profound that very few options of native species can be found in the market of landscaping plants. By making these species available, we at Legado das Águas are seeking to establish a model that has more respect for local vegetation. Being free to add a hard fern (*Blechnum brasiliense Desv.*), sulcata grass (*Setaria sulcataem*) or quaresmeirinha (*Tibouchina fortegillae*) to a project is an achievement. These are just a few examples of the various species that are being produced and made available for urban gardens, superseding this cultural logic that has reigned for so long. ■



How can animals hydrate in the desert? Why don't trees freeze at extremely low temperatures? How can life respond to plentiful variables of climate, soil type, excess or lack of resources? The means to survive developed by nature are numerous, scattered throughout every inch of planet Earth where there are living beings.

Human beings are always creating and demanding improvements in processes for which nature already accumulates 3.8 billion years of evolution. Biomimetics goes beyond science when it materializes into a practice for nature-inspired innovation, acting as the bridge between the understanding on how organisms or systems develop a strategy and the need for innovation and creation of mankind. Such innovation comes to life through a process called *Biomimicry Thinking*. It serves as new lenses for perceiving life, adopting a constantly curious and questioning perspective.

Biomimetics considers it important to observe and study how nature carries out its numerous processes. That means understanding how nature does what we want design to do. Biomimetics may be applied not only to the creation of products, materials or structures, which are tangible, but also to intangible topics, such as improvements in communication, management and inclusion strategies as well as ideation for new services. Its application in architecture and civil construction is crystal clear, whether in the pursuit for thermal and energy efficiency or for process improvement. Biomimetics can also be applied to business, being perceived in the creative potential to improve communication processes, team engagement, cooperation possibilities and better understanding of challenges.

One of the most popular examples of solutions developed using Biomimetics is Japan's bullet train. To reduce the noise caused by

the train, which exceeded acceptable noise pollution levels, the aerodynamics of the new models was inspired by the beak of the ringed kingfisher, which dives into the water to feed on fish, managing to do it silently, despite its flight speed and drastic change of environment. Another example is a wind turbine inspired by the shape of humpback whale fins. In this type of turbine, ribbed blades produce 32% less friction with the air and are 20% more efficient than conventional flat blades.

I participated in hotel project in Bahia, Brazil, which was inspired by flora and fauna solutions to increase its facilities' thermal comfort and reduce the environmental impact of the hotel's operation. One of these solutions came from the prairie dog, whose burrows are buried in the ground with different height and diameter entrance and exit holes, thus facilitating ventilation. Other sources of inspiration were the cacti, due to their capacity to create shading, and toucans, whose nozzle helps regulate heat.

In Biomimetics courses, we seek to understand essential elements and the principles of life. They are both understandings of how values manifest on the essential strategies that organisms or living beings develop to survive and self-perpetuate. The more we have the opportunity to observe diversity in a natural environment, the higher the chances of obtaining answers in nature.

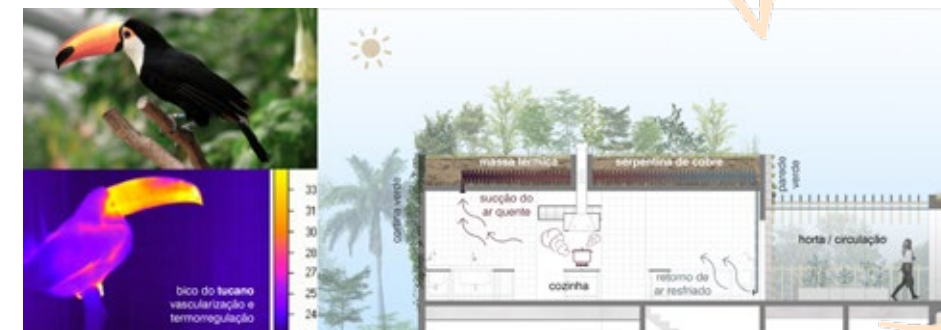
In 2019, during the course **Biomimetic Immersion in Legado das Águas** we realized that there is a place that enables us to experience the technologies of the Atlantic Forest by observing one of the forests with the world's richest biodiversity. Thanks to the vast natural assets of its biomes, Brazil is undoubtedly one of the world's most important destinations for the practice of Biomimetics. We have all the contexts and competences to be key players of this beautiful way of acting with innovation. Legado das Águas is one of the destinations that can materialize this possibility of protagonism. ■

'Alessandra Araújo is biologist, innovation designer and consultant in Biomimetics.

Science learns from nature

by Alessandra Araújo *

Biomimetics is the area of science that studies these strategies of nature – or all the mechanisms adopted by living organisms to deal with seasonal or cyclical day-to-day pressures involving aspects such as temperature, humidity, and water and energy management. It covers the systems included in the various ecosystems, analyzing the relationships between organisms to understand energy and occupation flows as well as how resources are managed. A humid tropical forest, for example, offers various solutions in water resource management technology.





A
window
into our
world

The forest involves, welcomes, and protects us, guaranteeing the lives of all who dwell and depend on it.

Back to the origins



Pomar Urbano Project takes Atlantic Forest trees to the banks of a São Paulo river

One of the large rivers that cut through the city of São Paulo, the Pinheiros River, had plenty of bends and floodplains when the city was still far from its borders. However, in the twentieth century the course of the river was rectified and its margins were occupied by fast vehicle lanes. The original route can no longer be rebuilt, but at least the dull landscape around the river can be replaced with a more pleasant outline for those passing by the region. This is the goal of the **Projeto Pomar (Urban Orchard)** Project, which envisages a 13-km landscaping project with native trees of the Atlantic Forest on the riverbanks.

Started in 1999 by the then State Department for the Environment with the support of the private sector, *Pomar Urbano* was established to replenish the vegetation along the riverbanks. In 2019, the project entered a new phase, uniting the current Department for Infrastructure and the Environment, the São Paulo Water and Energy Company (EMAE) and Reservas Votorantim, by means of a public call

Following the landscaping proposal created by Cardim Arquitetura Paisagística, seedlings of native species from Legado das Águas' nursery will be planted along the riverbanks. These species include *quaresmeiras* (purple glory tree or *Tibouchina granulosa*), *manacás* (glory bush or *Tibouchina mutabilis*), *ipês* (roble or *Tabebuia*), *araucárias* (Brazilian pine or *Araucaria angustifolia*), *pitangueiras* (Surinam Cherry tree or *Eugenia uniflora*), *jabuticabeiras* (Brazilian grapetree or *Plinia cauliflora*) and even the iconic *juçara* (juçara palm tree or *Euterpe edulis*). The idea is to give back to the urban environment some of the original landscape of the Atlantic Forest that existed there. Some native fruit trees, such as *cambuci* (*Campomanesia phaea*) and *araçá* (cattley guava or *Psidium cattleianum*), are ideal for attracting birds, transforming the Pinheiros river bank into an ecological air corridor



interconnected to other forest areas within the city. The combination of species, which creates a small-scale reproduction of the forest dynamics, reduces maintenance, pruning and watering of trees.

Sponsorship quotas sold to companies cover the project's implementation costs. The first partners, Banco BV, Votorantim S.A. and Parque Global, have already acquired their quotas. "The idea behind the sponsorship is to create a platform of companies concerned not only with environmental benefits, but also with the occupation of the riverbanks," said João Dias, coordinator of Reservas Votorantim's Business Area. "There is already a project to transform this area into a linear park, and the *Pomar Urbano* project is just the beginning. In this sense, Reservas Votorantim acts as executor of the project, offering knowledge in plant production and management of protected areas. As a result, the company helps transform the city of São Paulo, which necessarily involves strengthening the relationship between man and nature", added him. ■

Scent of the forest

The script of a wonderful new business case of success made feasible by biotechnology seemed to be already written. The story began in 2015 when the team of the Rio de Janeiro startup Bio Bureau, a partner of Legado das Águas, discovered the genetic sequencing of 50 Atlantic Forest species. Over the following two years, it searched that bank of 66 million genes to find proteins and enzymes that could be useful to the cosmetics industry, in a process called bioprospecting. A genetically modified yeast was soon developed. It had an Atlantic Forest gene with the ability to transform limonene (a substance found in high concentration in orange peel) into alphaterpineol, an input widely used in the perfume industry.

Such an effort made sense considering prices at the time, when a market survey found that limonene cost US\$2/kg, while alphaterpineol was being sold at US\$50/kg. Therefore, orange peels, a juice industry waste, could be used to produce a valuable input for the production of perfumes. Nevertheless, the volatility of this market soon became evident. When this technology had been mastered in 2018, limonene was costing US\$12/kg while alphaterpineol was being sold for only US\$2. "The biodiversity market is so poorly known that not even the information on substance prices is accurate," explained Mauro Rebelo, a partner at Bio Bureau.

This setback, however, marks only one obstacle at the beginning of a path that proves promising. In 2019, biotechnology became a business area at Legado das Águas. The gene bank, now called **Floresta Digital (Digital Forest)**, gathered a total of 99 sequenced species and 65 extracts including the phytochemical composition of those plants.



Perfume with extract created based on Legado das Águas' plants may be the first product resulting from the biotechnology research

Samples of essential oils from plants with the highest aroma potential were also developed. "Floresta Digital is an innovative project and our biggest challenge has been finding the business model that will allow us to overcome our technical challenges," said Mauro Rebelo.

The most important outcome of this work is about to come to life. We developed the first fragrance from extracts obtained from Legado das Águas' forest in partnership with a French perfume industry, one of the world's ten largest players. This perfume born in the Atlantic Forest is expected to hit the market in 2020. ■



Focus on environmental health

Two research projects study the parasite that causes malaria and map zoonoses in wild animals

After nearly a decade welcoming wildlife and flora researchers, Legado das Águas opened its door to scientists focused on health topics. "We want to broaden the outreach of Atlantic Forest research with health- and forest-related studies, thus generating knowledge that will help us better understand this area of expertise and benefit the entire society," said David Canassa, director of Reservas Votorantim.

An important step taken in 2019 was the consolidation of the **Legado das Águas Research Program (PPLA)**, aimed at promoting integration and synergy between scientific research and other areas of operation in the Reserve. The team defined the main courses of action, which unfold into lines of research and cross-sectional evaluations so that each project covers as many opportunities as possible. The PPLA has an internal research committee to evaluate projects, identifying their potential capabilities and integration with other areas.

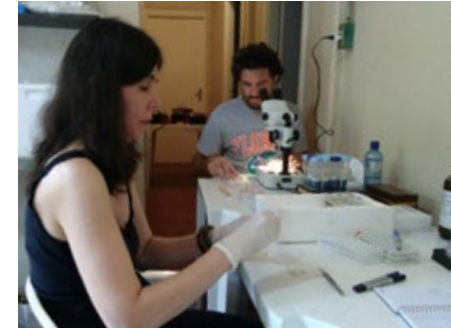
TRACKING MALARIA INTO THE WOODS

Originating in Africa, a parasite has been following human migrations across the planet for tens of thousands of years – that parasite is *Plasmodium falciparum*, which causes the most severe form of malaria and currently kills about 400,000 people per year*, mainly in Africa and Asia. Another parasite of the same family, *Plasmodium vivax*, which causes a milder and less lethal form of malaria, is the most common in the Americas, including Brazil, particularly the Amazon area.

Many campaigns conducted along the 20th century managed to eradicate malaria caused by *Plasmodium falciparum* in various parts of the world, such as Mediterranean Europe, North America and Southeastern Brazil. Nowadays, the Atlantic Forest is no longer considered a risk area and nor there are strategies to fight malaria at the region as the disease has vanished from urban areas. Nevertheless, the story does not end there.

Eradicated from the coastal line, the parasite sheltered in forest primates such as howler monkeys. "There is evidence that *Plasmodium falciparum* has adapted and occurs in wild and silent cycles in deep areas of preserved Atlantic Forest," explained Gabriel Laporta, PhD in Public Health and professor at Faculdade de Medicina do ABC. In 2012, *Plasmodium falciparum* was found in 10% of the mosquito samples collected in Tapiraí, a municipality within Legado das Águas' territory. However, the survey conducted by Laporta's team inside the Reserve in January 2019 found that none of the approximately 1,600 *Anopheles cruzii* mosquitoes collected had traces of the parasite.

* World Malaria Report 2019, World Health Organization



"This result was striking," said Gabriel Laporta. A hypothesis raised by him for the absence of parasites is that the yellow fever epidemic that occurred in the southeast of the Atlantic Forest between 2016 and 2018 drastically reduced the population of howler monkeys, the parasite reservoir, that is, the forest animals that serve as host for *Plasmodium falciparum* and *Plasmodium vivax*. This would have consequently reduced the prevalence of plasmodiums in mosquitoes, which are the vectors – they suck monkeys' blood and transmit the parasite when biting humans.

Another way to detect the presence of *Plasmodium falciparum* is by directly collecting blood from howler monkeys living in the forest, something extremely difficult to be done by researchers. As a result, a research led by Ana Maria Duarte, PhD in Public Health and researcher of the Superintendência of Endemic Control (SUCEN) of the São Paulo State Department of Health, has been seeking for indirect evidence. "Instead of capturing monkeys to collect blood, we search for traces of the parasite's DNA in their feces or another bioindicator, as in beetles that feed on such feces," explained Ana Maria Duarte.

Either by capturing mosquitoes or analyzing indirect traces, finding out whether or not *Plasmodium falciparum* is occurring in that region of Legado das Águas can unravel certain enigmas and bring a few solutions. "If we detect the presence of *Plasmodium falciparum*, the conditions would be the same as in the Amazon region – we will have the parasite, the reservoirs (monkeys), the vectors (mosquitoes) and humans," explained her. "Why then isn't malaria endemic here, that is, why doesn't it occur all the time, as in the Amazon?"

We will be closer and closer to finding these answers as research moves forward.

A SNAPSHOT OF ANIMAL DISEASES

Despite its excellent conservation status, Legado das Águas' forest is not isolated from cities or small groups of people living in its surroundings. Humans always have the company of domestic animals, which might have zoonoses – animal diseases – that can also affect wild animals. Arlei Marcili, PhD in Biomedical Sciences and professor in the departments of Veterinary Medicine at Universidade de Santo Amaro and Universidade de São Paulo, coordinates a project to find out the most prevalent zoonoses in domestic and wild animals in the reserve and its surrounding areas.

The first phase of the project, which involved collecting samples between 2018 and 2019, focused on the following zoonoses: toxoplasmosis, *American trypanosomiasis* (Chagas disease), leishmaniosis, spotted fever and leptospirosis. This study envisages the capturing of disease vectors, such as the barber bug or *Triatoma infestans* (Chagas disease) and ticks (spotted fever), as well as small mammals, such as rodents. The individuals captured were examined at the laboratory to check for the disease-causing agents, such as protozoans or bacteria.

In the first phase, the most relevant results denoted the presence of *Trypanosoma cruzi* in barber bugs, while no animal tested positive for this protozoan. The study found positive animals, however, for leptospira, the bacterium that causes leptospirosis. Leptospira was even isolated in a wild specimen (a rodent), something extremely rare to accomplish.

"In this project, we want to discover which diseases we find in animals, identifying which zoonoses have the highest occurrence in wild animals. Based on those findings, we will study the human population to understand the role of zoonoses in people's health", detailed Arlei Marcili. ■



photo: Gabriel Laporta

photo: Arlei Marcili

Science arrives at market

It all starts with the rescue of orchids from fallen trees amidst the forest. Rescued orchids are taken to Legado das Águas' orchidarium, and then treated, recovered and subsequently returned to the wild. In four years of work, biologist Luciano Zandoná rescued 7,000 specimens and recorded 232 species in the forest of the Reserve – 14 of which are on the red list of endangered species. One of them, the *Octomeria estrellensis*, had already been considered extinct in the wild in the state of São Paulo for more than 50 years.

Legado das Águas' orchidarium houses 1,610 living orchids of 175 species. More than a shelter that brings rescued specimens back to life, the orchidarium has become a birthplace of new orchids, in such a way that in the near future those species that are crucial to the equilibrium of the Atlantic Forest will no longer be illegally plucked from their habitats and sold in any street corner. There, eight species of wild plants were pollinated and generated seeds, which were then sent to a laboratory for seedling

production. After two and a half years growing inside glass vials and another six months adapting to real environmental conditions in the nursery, the first plants were ready and will be available for sale in early 2020.

"It's an important milestone for Legado das Águas, as we converted scientific research into a commercial product," declared Zandoná. "Our initial focus is on rare and endangered species. Three of the eight species in the process of producing domestic seedlings are on the red list of endangered species," he said. The first to be produced, *Octomeria estrellensis*, generated 1,000 laboratory-grown specimens that turned into seedlings.



Like all other plants produced in Legado das Águas' nursery, the small orchids have a QR code where the entire production process is recorded, from the origin of the seed to the sale of the plant. "They are the first orchids sold in Brazil with this traceability protocol," said Zandoná. This code ensures that orchids were not directly extracted from the forest for commercialization, which is an environmental crime – orchids are the plants with the highest rate of illegal collection in the world. By buying a tracked seedling or specimen, consumers know that they are contributing to the preservation of the Atlantic Forest and not to its destruction.



Rare amphibian captured

Legado das Águas' herpetological fauna survey started to implement a new strategy from 2019 onwards. As it is more difficult to spot snakes than amphibians, the team set traps to capture reptiles. "The use of traps is important to find animals that are rarely sampled by the traditional visual or auditory search method, thus capturing a higher number of species," explained the biologist and scientific director of the Biological Museum of the Butantan Institute, Giuseppe Puerto, partner of the Reserve in this project.

This first attempt using traps was unsuccessful for reptiles due to the characteristics of the soil, which is highly clayey and retains lots of water. However, the team captured a very rare, not easily sighted amphibian species, the *Macrogenioglottus alipioi*, known as *sapo-andarilho* (Bahia forest frog). It was the first record made in Legado das Águas of this species endemic to the Atlantic Forest.

Between 2016 and 2019, the survey of the herpetological fauna at Legado das Águas recorded:

- 44 amphibian species
- 21 snake species
- 4 lizard species
- 2 turtle species



photo: Giuseppe Puerto/ Instituto Butantan

New rare species registered

A very rare butterfly species was spotted at Legado das Águas for the second time. In 2017, researchers found a specimen of *Godartiana byses*, a species that had never been sighted in the state of São Paulo. In 2019, two female individuals of the *Prepona deiphile deiphile* species were captured. This species is endangered and had only been seen twice in the state. After being identified and photographed, the butterflies were returned to nature.

Biologist Laura Braga, coordinator of Legado das Águas' butterfly survey project in partnership with Sustentar Institute, says that the registration of these two individuals indicates that there may be more butterflies of this species so difficult to find. "They inhabit the canopy, that is, the very high tree tops of the Atlantic Forest," explained Laura. "This further emphasizes the importance of this discovery."

Between 2016 and 2019, 322 butterfly species were identified with 1,842 individuals registered

HOME SEARCHES

In 2019, Legado das Águas launched two research projects conducted by its own team. One of them is the construction of a melipona hive aimed at producing honey from stingless bees, native to the Atlantic Forest. After a course on raising stingless bee species and honey production, resulting from a partnership with the Society for Wildlife Research and Environmental Education (SPVS), the team began to get organized to capture the bees and transfer them to hives along Legado das Águas' trails. "When the hives are formed, we will be able to show visitors how honey is produced and talk about the importance of bees for the Atlantic Forest," explained José Alves Batista, tour guide at Legado das Águas. The other project is the compilation of wildlife sighting data by Legado das Águas' team (see more information on pages 32 and 33). ■



photo: Laura Braga

Shelter for threatened primates

Legado das Águas becomes a global priority area for the protection of Southern muriquis, a critically endangered species

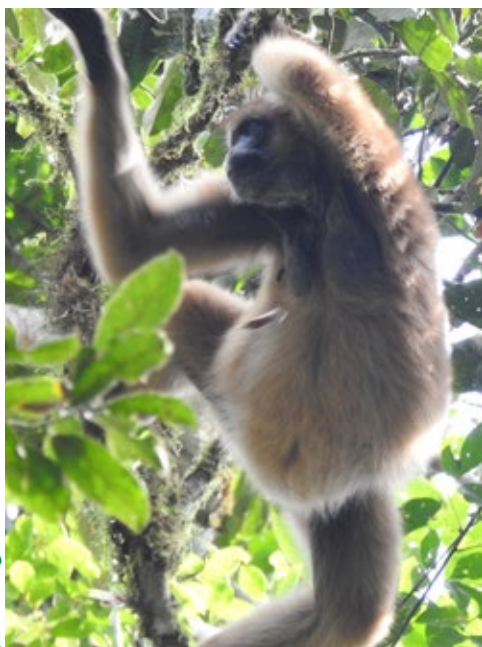


photo: Miguel de Jesus

Were it only for their beauty and grandeur, it would be worth fighting to preserve them, but the greatest primates in the Americas also play the crucial role of keeping forests alive. Due to being the most important dispersing agents for seeds of many tree species, especially the large ones, Southern Muriquis (*Brachyteles arachnoides*) are called the "forest gardeners." Native to Southeastern Brazil, they have populated the Atlantic Forest for 11,000 years. Their story, however, may be nearing the end.

In the list of endangered species released by the International Union for Conservation of Nature (IUCN) in 2019, the Southern muriquis was classified as a critically endangered species, climbing one step in the endangered species scale. There are only two levels above that category – extinct in the wild and extinct. In the Southeastern region, the main causes for animal extinction are hunting – illegal and considered an environmental crime – and habitat loss, due to the reduction in Atlantic Forest areas in Northeastern Paraná, in the central portion and east of the state of São Paulo and in Southern Rio de Janeiro.

In this scenario, Legado das Águas emerges as a safe haven, as it was considered by the IUCN as one of the three global priority areas for the conservation of that iconic species of the Brazilian fauna. In addition to its forest in excellent conservation status, Legado das Águas is home to about 100 Southern muriquis or almost 10% of the species' entire population, calculated at about 1,100 and 1,200 individuals.



photo: Camila, Instituto PróMuriqui

Maurício Talebi, professor at the Department of Environmental Sciences of Universidade Federal de São Paulo (Diadema Campus) and scientific coordinator of the Pro-Muriqui Institute is responsible for this estimate. Talebi has conducted research on Southern Muriquis at Legado das Águas since 2012. He was one of the authors of the study that underpinned the raising of the level of endangerment by the IUCN. "Researching the muriquis at Legado das Águas has always been very difficult, as animal groups are usually found deep into the forest, more than 10 kilometers away from any road," explained Talebi. "It takes in excess of four hours of walking into the forest to reach the areas mapped as preferred habitat of those animals." Having devoted this kind of effort over a number of years, Talebi's team was able to directly observe only 37 individuals of a population estimated at more than 100 muriquis in the entire reserve.

As a global priority area, Legado das Águas became an even more important hub for research for the conservation of Southern muriquis. At the current rate of disappearance of the species, they might no longer exist in 50 years. It would not only be the end of the animals, but also of the good living conditions in urban regions of the Southeast, such as São Paulo and Curitiba. "If Southern muriquis go extinct, the seeds of large tree species will no longer be dispersed, the forest will lose its structure and gradually end," explains Maurício Talebi. Without the Atlantic Forest areas guaranteeing the volume and quality of water sources, large urban areas in the Southeast of the country will surely have a very dry future.

"We plant muriquis to harvest water: animals living in the wild ensure the preservation of the forest, which in turn protects the springs that provide the water we drink."

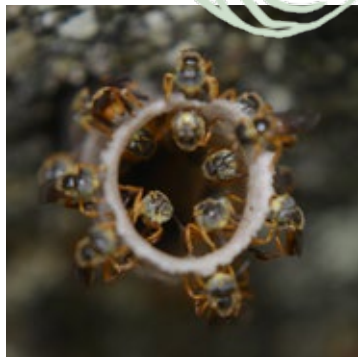
Maurício Talebi, researcher at the Pro-Muriqui Institute

"By protecting around 10% of the known population of Southern muriquis, Legado das Águas becomes one of the last long-term survival hopes of this species throughout Brazil," said Frineia Rezende, executive manager of Reservas Votorantim. "Unfortunately, habitat destruction and hunting are still a reality, threatening the survival of the largest monkeys of the Americas. That is why, research projects are so relevant, particularly those that promote knowledge to ensure the protection of endangered species."

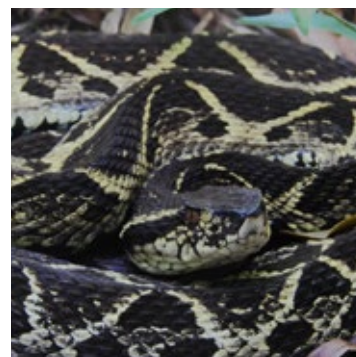
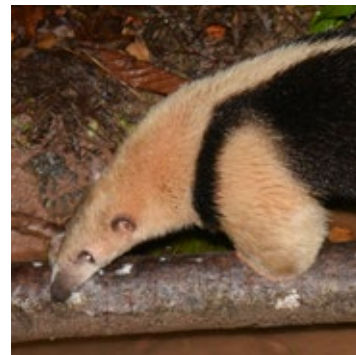
At Legado das Águas, we understand that the richness of a forest depends on the existence of dispersing animals and diversity of species, whereas each of them plays an important role in the forest. "A forest is only alive if you also ensure the diversity of its fauna," Frineia concludes. ■



Teams of environmental guides and monitors register and generate wildlife sighting data

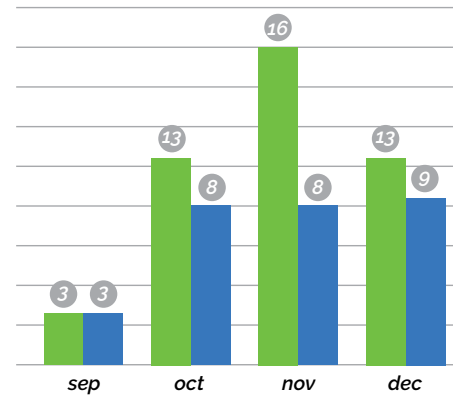


Keeping an eye on trails and animals



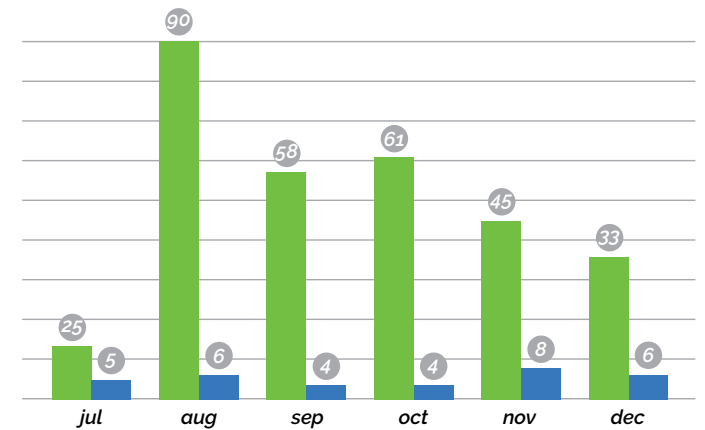
● number of sightings
● species sighted

Sightings by guides and monitors



● number of records made
● species registered

Camera traps

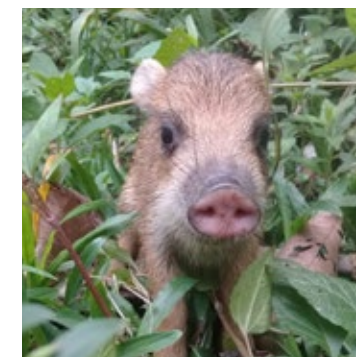
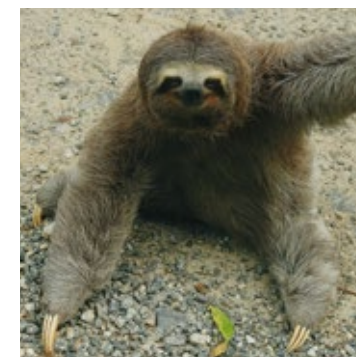


In 2019, a Legado das Águas' team began a new project to compile and analyze fauna registration and sighting data. This research aims to expand the coverage of scientific data collection and use the information to implement fauna monitoring programs and studies on species' population flows. In the medium term, the results of this project will enable the launch of tourism activities dedicated to the sighting of fauna in the Reserve.

As part of the tapir monitoring research carried out in partnership with the Manacá Institute, Legado das Águas' tourism guide teams were trained to help monitor medium and large mammals using camera traps. Subsequent to the end of the research in the second half of 2019, the guides absorbed and executed the fauna registration work with camera traps internally. This was also one of the aspects of the fauna recording and sighting project.

The second arm of the project is carried out by environmental guides and monitors who, thanks to dynamics of their work, cover the Reserve's trails and roads on a daily basis. They are the most important means for generating sighting data. Since September 2019, the work was oriented so that wildlife and sightings records be done more frequently and providing more comprehensive information. "When we spot an animal, we write down the location with GPS coordinates, the time of the sighting, the number of individuals and whether there were females with offspring," explains Miguel de Jesus, field technician at Legado das Águas. Records of the animals' footprints and vocalizations are also made when it is possible to hear them.

"Despite the little time elapsed since its launch, the fauna registration and sighting project has produced promising results. In the second half of 2019 alone, camera traps captured 334 views of 16 species. The 45 sightings recorded by Legado das Águas' team registered as many as 22 species," said Gabriel Gade Mesquita, sustainability analyst at Legado das Águas. ■



Photos: Legado das Águas' team

Integrate to develop

Over the past eight years, Legado das Águas' main goal in the municipalities where it operates – Juquiá, Miracatu and Tapiraí – was to get closer to the community and invest in actions to strengthen municipal bodies. "Since the creation of Legado das Águas, we communicated our intent to become an integrated part of the territory, striving to act in a sustainable manner, while making social investments and respecting the local reality," said Daniela Gerdenits, Social Responsibility consultant at Reservas Votorantim. This goal translated into the promotion of programs and projects aimed at creating a positive social impact, integrating and engaging various social players such as public agencies, associations, communities, NGOs and companies.

Legado das Águas supports municipal leaders and the civil society to foster territory development

The Legado das Águas Social Initiatives program has five major investment goals, the first tree, with the support of the Votorantim Institute:

- Promotion of economic activities through the ReDes program;
- Institutional strengthening with programs supporting public management (Public Management Support Program - AGP);
- Program for the Appreciation of Education (PVE);
- Engagement of local and regional people and institutions;
- Integration and engagement with Legado das Águas' internal community and employees.

In addition to the projects already in progress, a work plan was implemented in 2019 to support the municipalities, involving the departments of education, the environment, tourism and culture, as well as the children and adolescents municipal councils. According to Daniela Gerdenits, in the coming years we will also continue to focus on strengthening entrepreneurship in the region, "seeking partnerships to help empower local players, thus contributing to local social and economic development without losing sight of the goal to preserve the Atlantic Forest."



Photos: Eliza Carneiro/Turismo 360

THE PARTNERSHIP FOR THE APPRECIATION OF EDUCATION WAS A HIGHLIGHT IN JUQUIÁ

Improving education in public schools is the goal of the Partnership for the Appreciation of Education (PVE) Program. The program operates in several Brazilian municipalities to provide training to managers of education departments, directors and pedagogical coordinators of schools as well as mobilize the civil society. PVE has been implemented in Juquiá for the past four years as an initiative of Legado das Águas in partnership with the Votorantim Institute and the City's Department of Education. The program directly benefited 2,121 municipal school students.

"We consider PVE a great ally in the search for quality education for all people," declared José Mendes Cruz Junior, Secretary of Education for Juquiá. "The considerations and studies launched during the educational process were essential to better care for the network's students and monitor learning." For Frineia Rezende, executive manager at Reservas Votorantim, the continuity of the PVE is essential to help educators and the community realize the importance of the ongoing effort to improve public education. "Improved management benefits everyone and the impact goes beyond classrooms, bringing more quality of life and development to the municipality," commented her.

PUBLIC MANAGEMENT SUPPORT PROGRAM (AGP)

In 2019, the highlights of the partnership celebrated between Legado das Águas, the Votorantim Institute and the Brazilian Development Bank (BNDES), that is, the Public Management Support Program (GPA), included the implementation of initiatives in Juquiá and Miracatu, such as specific training and the production of publicity materials, arising from the Integrated Regional Tourism Plan (PTIR), and the preparation of the first Participatory Master Plan in Juquiá.

Visible results

Legado das Águas' social performance helped improve the management of municipalities and the quality of life of their inhabitants. Here are some of the examples:

- Help municipalities develop municipal plans. The plans were necessary not only for the development of the municipalities, but also to help them comply with legislation. A concrete result of this support, based on initiatives started in 2016, was the obtaining of the certification of **Municipality of Tourist Interest (MIT)** by the three municipalities where Legado das Águas is located. By becoming an MIT, the municipality receives funds from the State Government to develop tourism, investing in sectors such as infrastructure and environmental conservation;
- Help develop and manage pedagogical planning in partnership with the education department of Juquiá through the Partnership for the Appreciation of Education (PVE) program, investing in team building and impacting their practices inside and outside the classroom;
- More than R\$200,000 in income generated by small producers (honey and family farming) thanks to ReDes projects;
- Local traders' testimonials on increased profit after the implementation of actions learned in the training sessions and assistance offered by the Public Management Support Program focused on tourism;
- Technical assistance and establishment of partnerships with the municipalities to support and enable initiatives that foster their development.



INTEGRATED REGIONAL TOURISM PLAN (PTIR)

Created in 2017 as one of the concrete results of the Public Management Support Program (AGP), the Integrated Regional Tourism Plan is a guiding instrument for Municipal Tourism Councils (COMTURS) and entrepreneurs linked to the tourism chain regarding planning, qualification, management and project implementation initiatives. We present below the most relevant initiatives carried out by the Integrated Regional Tourism Plan (PTIR) in 2018 and 2019:

- 10 certification programs with the participation of more than 250 people.
- 46 entrepreneurs assisted.
- 28 Municipal Tourism Council (COMTUR) meetings.
- 1.100 professional photos produced for image banks to be used in promotional materials.
- 13 presentation or promotional materials produced for businessmen and local entrepreneurs.
- tourist destination trademarks developed for Juquiá and Miracatu.

Adopting the slogan *Encontre suas raízes (Find Your Roots)*, the Miracatu population chose the trademark out of three proposals prepared by



photos: Eliza Carneiro/Turismo 360

consulting firm Turismo 360 Consultoria. The idea was inspired by ecotourism activities – which allow a connection with the wild, such as trails and waterfalls – as well as by the culture and the way of life in Vale do Ribeira. An example of this cultural rescue is Banarte, an association with 40 members that maintains the local crafts tradition using banana tree fibers, with a monthly production of approximately 2,000 pieces.

In 2019, the consulting firm's support helped leverage the Association, an initiative that was crucial to its survival, as the Association had almost closed in the previous year. By adopting credit card sales, disclosing their work on social media and promoting guided tours, Banarte saw its revenues triple, according to its president, Leila Alves.

The support to the Integrated Tourism Plan changed the scenario. We noticed that everyone in the city is valuing regional traditions; they are excited about the growth possibilities.

Leila Alves, president of Banarte, a traditional craft association

Another relevant project in 2019 was Legado das Águas' support drafting the first **Participatory Master Plan of Juquiá**, an instrument that will establish the guidelines for the 2020-2030 municipal plan. A detailed diagnosis was devised based on the participation of the population in ten workshops with 267 representatives of the urban and rural communities, as well as meetings and hearings. On December 16, the Plan was unanimously approved by the City Council.

ReDes FOR LOCAL DEVELOPMENT

The ReDes (Networks for Sustainable Development) program in Vale do Ribeira is a partnership celebrated between Legado das Águas, the Votorantim Institute and Brazilian Development Bank (BNDES).

In order to generate income for local entrepreneurs, Legado das Águas has been contributing resources to the Program since 2016, thus encouraging the development of two entities.

One of the projects supported is *Mel do Vale*, an initiative of the Regional Association of Beekeepers (APIVALE) of Juquiá. Bringing together 45 producers from 14 municipalities, APIVALE began to implement the initiatives proposed in the 2018 project after an incubation period. In 2019, production increased by 25% and two collective sales were made. "Our production has grown substantially and we expect it to grow even more. A fact that will add value to our product," celebrates Joaquim Coelho Filho, president of APIVALE. We expect honey production to reach 10 tons in the upcoming harvest, he said.

Another major project is the one carried out by *Associação Rural Comunitária de Promoção Humana e Proteção à Natureza de Tapiraí (Tapiraí Rural Community Human Promotion and Nature Protection Association)*, with 15 members growing various products, such as lettuce, cabbage, *mandioquinha (Arracacia xanthorrhiza)* and ginger. In 2019, four planting efforts and four qualification courses were carried out for the members. The products they cultivated began to be sold to Legado das Águas and Sorocaba's CEAGESP. Thanks to that initiative, there was a 70% increase in the Association's revenue and a 31% increase in members' income. "The annual production of ginger, our strongest product, has virtually doubled, from 15 to 30 tons," explained André França de Sá, president of the Association. "A lot has improved in comparison to last year, as our production has grown and sales to CEAGESP have increased our income."



PROMOTION OF EVENTS

Diálogos 2019 (Dialogues) – held by Legado das Águas, the event has the goal of bringing together representatives of governments and the civil society to disseminate the results of social initiatives, in addition to sharing experiences and strengthening engagement and partnerships. The second edition of the event included 22 participants from six municipalities of the Vale do Ribeira region. This meeting strengthened relationships and promoted synergistic initiatives of interest to all, mainly on the areas of tourism and entrepreneurship.

Desafio voluntário (Volunteer challenge) – 23 employees of Reservas Votorantim and guests carried out a volunteer initiative at *Lar de Idosos de Miracatu (Miracatu Elderly Home)*, which is the home to 22 senior citizens. In addition to enjoying recreational activities with the employees, such as board games and storytelling, the elderly visited the headquarters and nursery of Legado das Águas. The initiative had the purpose of offering activities to integrate all the participants and promote experiences that could add value to everyone's life. ■



Education for the *future*

Legado das Águas believes that only through engagement efforts can we succeed in long-term conservation. In support of this strategy, the Environmental Education program promoted several initiatives in the municipalities of Vale do Ribeira throughout 2019 to show the value of the Atlantic Forest and emphasize the role of all parties in the protection of this endangered biome. Acting on behalf of conservation is even more important for young people, because the standing forest encourages sustainable development in the region, thus creating more jobs in areas such as ecotourism. We present below the main environmental education activities developed in 2019.

Environmental Education in 2019:

- 11 topics addressed
- 37 events carried out
- Approximately 4,900 people affected
- 6 municipalities involved

Public assisted: Votorantim employees (Votorantim Energia, CBA and Legado das Águas), public agencies, students and the community in general

PARTNERSHIP WITH THE MIRACATU HEALTH SURVEILLANCE PROGRAM

In partnership with researcher Giuseppe Puerto of the Butantan Institute, Legado das Águas held in Miracatu a training program on venomous animals for the city's primary healthcare workers: nurses, nursing technicians and community health agents.

1st ENVIRONMENT SYMPOSIUM OF MIRACATU

In June, around 3,000 students participated in a three-day event of lectures and exhibitions at the 1st Environment Symposium of Miracatu, held by Legado das Águas in partnership with the Municipal Department of Education and the Mobilization Group of the Partnership for the Appreciation of Education (PVE). A few of Legado das Águas' partners, such as the Manacá Institute and the Butantan Institute gave lectures at the event. The Symposium also featured the *Floresta Viva* (Living Forest) exhibition by photographer Luciano Candisani. "The *Floresta Viva* project has the mission of producing photographic images capable of connecting people to the great biodiversity still present in large Atlantic Forest remnants, such as Legado das Águas and the other reserves in Vale do Ribeira. For me, it is a joy to see these images fulfilling their role of informing, educating and inspiring people to care for the forest," said Candisani. The symposium allowed students and the Miracatu community to broaden their knowledge on Atlantic Forest fauna, flora and biodiversity.



ECOTOURISM AT SENAC IN THE MUNICIPALITY OF REGISTRO

During the Tourism and Hospitality week, promoted by the National Service for Commercial Education (Senac) of the municipality of Registro, the lecture "Ecotourism in the Atlantic Forest focused on Legado das Águas" was given by William Mendes, manager of Public Use, Ecotourism and Sports of Legado das Águas. The *Floresta Viva* exhibition was held on September 16 and 20 at the event, receiving students and community members.



SOCIAL AND ENVIRONMENTAL INITIATIVES IN ALUMINIO

As part of the environmental calendar several activities were carried out across the year in partnership with Companhia Brasileira de Alumínio (CBA) on the following topics: Atlantic Forest and Biodiversity Day (May), Environment Day (June), and the Tree Week (September). Giuseppe Puerto, of the Butantan Institute, also presented a training program on venomous animals for company employees.



TAPIRS AND THE FOREST

On the International Tapir Day (April 27), a lecture on Brazil's largest herbivore was held in Tapirai for students of the Turvo neighborhood. The municipality has a highly preserved Atlantic Forest stretch, which makes it crucial to raise awareness among young people on the importance of the forest and biodiversity.

The lecture was given by Mariana Landis, of the Manacá Institute, a partner of Legado das Águas in the project for tapir monitoring and conservation in the Reserve.

TREE MONTH IN TAPIRAÍ

In September, we promoted an initiative for the planting of trees in partnership with the Municipality of Tapirai. Children from the municipal school system participated in workshops to create signs with messages of care for the environment that, later on, were installed at the entrances to the city, in addition to the planting of Atlantic Forest native species in those locations. The group *Centro de Convivência dos Idosos* (Center for the Interaction with the Elderly) also participated in the initiative.



DONATION OF SEEDLINGS

During the year, we maintained a partnership with the Olinto Marques de Paulo (OMP) Institute to carry out the *Árvore Generosa* (Generous Tree) program with the goal of raising awareness in people, especially children, through the donation of seedlings of Atlantic Forest species. Legado das Águas participated as a partner in environmental education activities held in several municipalities, such as the planting of seedlings in the Tree Month in Tapirai and the Tree Week in Aluminio.

THE HISTORY OF BUTTERFLIES

In celebration of the World Water Day in March, biologist Laura Braga held an art workshop and a lecture on the natural history of butterflies and their ecological importance at Escola Serraria. She also explained how research on the species is conducted. ■



Adventure on behalf of *Science*

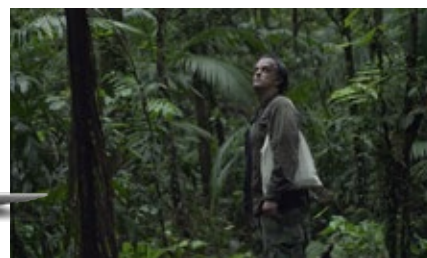
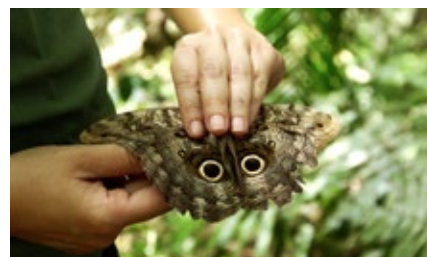
The Mata Viva (Living Forest) series depicts the routine of researchers at Legado das Águas' forest

Neither the rain nor the mud, not even the heat or tiredness are obstacles that stop them. The professionals involved in the research conducted at Legado das Águas travel kilometers into the forest in search of butterflies, snakes, Southern muriquis or very rare orchids. This fieldwork was documented by producer Crioula Câmara and subsequently transformed into a series: **Mata Viva – Ciência e Aventura na Mata Atlântica (Living Forest – Science and Adventure in the Atlantic Forest)**.

With more than 70 hours of footage, the result of journeys totaling more than sixteen hours on trails or overnight stays in the woods. João Daniel Donadeli, creator and director of *Mata Viva* (Living Forest), said that the objective was to reveal how field research is done, when scientists are far from their laboratory environment. "We show struggles, falls, frustrations and achievements," said Donadeli. "The program appeals to all kinds of audiences, especially those who like series depicting adventures and the wild."

With eight episodes, the series was originally broadcast on TV Climatempo Bio and is currently available on YouTube: bit.ly/MataViva

Scan the QR Code above and watch the episodes on the Mata Viva series



Forest *internship*

With only two years of history, success is already absolute. The first edition of *Programa Estágio de Férias* (Vacation Internship Program) at Legado das Águas, held in 2018, had ten candidates from four colleges. At the end of 2019, the fourth edition of the program received almost 500 student applications from educational institutions spread across several states of Brazil. The five students selected completed the internship between January and February 2020 in the areas of **Ecotourism, Research and the Environment, Quality and Environmental Management System, Environmental Education and Nursery**. A novelty in the most recent process was the use of a blind method – those responsible for choosing the interns had access to the résumés but names and genders were concealed, so that candidates would be selected solely based on their competence.

At the vacation internship, students have the opportunity to experience the dynamics of an innovative business and take their experiences to universities

"The program has excelled in many ways, as it brings students closer to the multidisciplinary experiences of Legado das Águas, both in the business and relationship spheres," says David Canassa, director at Reservas Votorantim. This way, students become ambassadors within the academic environment of a new model of protected area, which generates business and intends to capture revenues by preserving the standing forest, not to mention the contribution to the development of the territory.

Marina Menezes Giusti, then a tourism student at Universidade Federal de São Carlos, attended an internship in Ecotourism in early 2019.

After the thirty-day immersion in the Atlantic Forest, she had the opportunity to be experience all the areas of activity of Legado das Águas. "Being around different people from varied backgrounds greatly added to my knowledge and experience. It was amazing to see a new business model being embraced by so many people," she said. Months later Marina became an employee, hired to take care of the administrative area of the inn and ecotourism activities. "The internship gave me a true knowledge about Legado das Águas and I was able to understand its mission and purpose, reconciling environmental conservation and value generation with social issues, which is considered very important here," recalled Marina.

For Frineia Rezende, executive manager at Reservas Votorantim, the Vacation Internship program gives students the opportunity to see an example of the new economy in operation. "Legado das Águas is very different from all you can find in the market, as there is no other environmental asset managing company such as Reservas Votorantim, nor there is a private reserve like Legado das Águas, established as a corporation", defines Frineia. "And due to the internship, we can find people with the ability to tackle innovation and help us in this business model," concluded her.



What's to *come*...

After opening our doors to the public in general, we saw visitation to Legado das Águas increase month after month in 2019. For us, 2020 will be a milestone, as we will complete a full year in operation at full capacity. Check some of our key goals for 2020:

- improve and increase public use by offering more ecotourism products and services to visitors. Certify local tour guides so that they can bring their own clients to Legado das Águas, thus supporting the development of the territory;
- expand the visibility of Legado das Águas as a center for environmental education, by developing more and more activities in the municipalities of the territory where we operate and encourage schools and agencies to develop environmental study activities in the Reserve;
- use *Patio Caeté*, which will be inaugurated in São Paulo, as a support center for the sale of plant specimens and to hold group meetings to discuss the integration of the Atlantic Forest into the city;
- increase our performance in environmental compensation after the approval of the state legislation that regulates the sector at the end of 2019; and
- implement *Projeto Portas Abertas* (Open Doors Project), through which every month we will welcome a Vale do Ribeira institution (such as NGOs, schools and community associations), which will visit Legado das Águas free of charge.

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