

12

NURSERY: INCREASE IN
PRODUCTION AND TRACEABILITY

20

ECOTOURISM MAKES
HEADWAY IN LEGADO

26

THE DISCOVERY OF AN
ENDANGERED ORCHID

30

RESEARCH INTO JAGUARS,
BIRDS, TAPIRS, BUTTERFLIES



Report
2017

LEGADO
DASÁGUAS

RESERVA VOTORANTIM

CREDITS

Reservas Votorantim Ltda.

Board: David Canassa e Frineia Rezende

Coordination: Kamilla Barboza Lopes

Team: Adenir Torres Lima, Aline Rodrigues, Aline Taminato, Americo Dias Marinho, Antônio Godoy, Augrisso da Silva, Beatriz Monique Rita, Cibele Pereira dos Santos, Daniela de Souza Santos, Edileusa da Veiga Silva Oliveira, Elaine Izabel de Moura, Emanuelle Karoline da Silva Souza Cruz, Gabriel Mesquita, Hellber Pereira Garcia Junior, Izabel Pironi, João Francisco Dias, Madalena Santos do Amaral, Márcia Paes, Matheus dos Santos Ferreira, Mayara Mira, Miguel Flores, Nelci de Pontes de Jesus Godoy, Nicolas Gomes de Souza Neves, Rodrigo Inojosa, Simone Alves Conte, Tatiane Graciolli de Jesus, Thiago Nicoliello, Valdirene Pires de Godoy Oliveira e William Souza

Reporting and text editing: Dante Grecco

Text revision (portuguese): Regina Caetano

Text revision (english): Tony Rosenberg and Alyne Azuma

Graphic design and layout: Rafael Agostinho

Photography: Luciano Candisani, Luciano Zandoná e Crioula Câmera

4	Editorial
5	Conserved nature
6	Important facts and events in 2017
10	Courses in which Legado made its mark
12	Nursery begins tracking seedlings
14	The first forest restoration projects
16	Legado hosts the Legal Reserve Forum
18	The importance of water in the world
20	Opening up to Ecotourism
22	Challenges and progress in UN's Decade for Biodiversity
24	The mirrored river
26	Important work rescuing rare orchids
28	The strong ties between rivers and oceans
30	The Atlantic Forest Laboratory
32	The living forest
34	Research into birds, reptiles and amphibians
36	Yellow fever and the primates
38	Supporting entrepreneurship, reviving the culture and history of a Caboclo community, integrated tourism plan, social efforts
42	Nature revealed
44	The emblematic little bird of Legado das Águas, the Buff-throated Purple Tuft (Anembezinho)
46	What's to come?

LEGADO DAS ÁGUAS: AUDACITY THAT PAID OFF

"It has already been six years since we laid out and approved the business plan for Legado das Águas (Waters' Legacy). At the time, we knew it was a courageous and daring project. We were also aware that it was uncharted grounds, innovative mainly because, within the private initiative, nobody had ever done anything similar before. That is, using an immense area of preserved forest as a business opportunity to foster territorial socio-economic development and generate shared wealth. Earlier plans pointed towards research and relationships with the local community. However, at the time, we really had no way of knowing what Legado would become six years later. Everything really multiplied, grew and developed.

A number of work fronts opened up. Some branches produced offshoots that, in turn, bore new fruits (and leaves). Because we had no references to follow, we learned along the way. With this, we became aware of the needs and the demands required from us by the society and regions with which we had contact. We also began to consolidate partnerships with top professionals in each of the areas where we had decided to work. We knew there was an enormous challenge to overcome.

The upside of this learning process was to see that all of our original thoughts were correct. Within just six years, we have much to celebrate despite, as everyone knows, 2017 being a very complicated year for all economic sectors. In spite of this hurdle, we were able to get the three programmed activities underway to

generate income: ecotourism, the production and commercialization of seedlings from the nursery, and environmental compensation via the legal reserve.

In terms of ecotourism, throughout 2017, Legado received a number of visitors interested in trekking the paths through the forest, riding mountain bikes, navigating the reservoirs along the Juquiá River, waking up early to listen to the birds chirping or taking part in the many experiments in environmental education lead by our researchers and specialists. The native plant nursery underwent some important changes; new equipment was delivered and implementation of a modern and unprecedented tracing system began. Besides this, there was a change of focus. From now on, the nursery places more emphasis on producing native ornamental seedlings, which promises excellent results in the coming years. Finally, after several debates, analyses and judicial rulings involving significant organizations, we were given the green light to formalize our first environmental compensation contracts.

All of this and more can be seen in the following pages, which offer a summary of the main initiatives taken by our internal teams, consultants and partners in 2017, whom, by the way, we would like to thank for all their dedication, professionalism and involvement.

We wish you all an enjoyable read. In the year Votorantim turns 100, celebrating positive results is a reason to feel proud. And, once again, we reiterate our invitation for you to come and experience nature in Brazil's largest private Atlantic Forest reserve." ■

David Canassa, João Schmidt e Luiz Marcelo Pinheiro Fins
Directors, Reservas Votorantim



A total of 31,000 hectares in an advanced stage of conservation. Located in the south of São Paulo state, nestling between the towns of Juquiá, Miracatu and Tapirai, spliced by the Juquiá River, Legado da Águas, the largest private reserve in the Atlantic Forest has, over the last six years, become a rewarding place to study, research and conserve biodiversity. It has also become an important area dedicated to environmental education. There is a number of projects which help prove that the standing forest is extremely valuable.

2017: A YEAR FULL OF VICTORIES AND ACHIEVEMENTS

Over the past year, recognition of Legado das Águas as an important conservation initiative has grown. This is certainly a reflection of the important work carried out during 2017 by the Legado teams who, together with dozens of organizations, institutional partners and researchers, were responsible for ensuring the initiatives, surveys and projects for appreciating biodiversity, territorial development and local community history became known to the general public, to the representatives of the three municipalities (Juquiá, Miracatu and Tapirai) where Reserva is situated, and to the opinion formers and specialists who work in environmental conservation. The following are a few of the most significant events in 2017.



THE INNOVATIVE PROJECT OF PRIVATE RESERVE MANAGEMENT

Reserva was among the winners of the 2017 ECO Award, sponsored by the American Chamber of Commerce (Amcham) for the companies that have implemented socially-responsible practices. Innovations in management resulted in Legado receiving the award in the category "process sustainability". This is because Legado das Águas' main premise is to be an innovative initiative in which it is possible to generate income while encouraging the development of the land where Reserva is located, involving the local population and the surrounding towns in efforts to maintain the forest standing. Some examples of these activities are ecotourism, legal reserve compensation and the sale of native Atlantic Forest seedlings, as well as running social projects such as Public Management Support (AGP), the Votorantim Partnership for Education (PVE), among others, possible. Amcham created the ECO Award in 1982 to acknowledge and disclose information on corporate sustainability. In Brazil, over the past three decades, it has already inspired over 2,000 businesses to submit their projects.

“

Our environmental assets are conserved and create inclusive businesses, in which protecting the area, strengthening communities and the activities of the new economy happen in harmony.

Frineia Rezende, Executive Manager of Reservas Votorantim

AWARDS, TRIBUTES, HEADLINES IN REGIONAL AND NATIONAL MEDIA, EVENTS, EXHIBITIONS, COURSES... DISCOVER SOME OF THE MAIN INITIATIVES OF LEGADO DAS ÁGUAS

NATIONAL BIODIVERSITY AWARD

Legado das Águas won the *Business* category in the second edition of the 2017 National Biodiversity Award – promoted by the Ministry of the Environment. Its aim is to recognize initiatives within both the public and private sectors, social and professional organizations that stand out for their efforts to improve the conservation of species found in Brazilian biodiversity, contributing to the achievement of the National Biodiversity Targets. In all, there were 17 finalists divided into six categories: Academia, Companies, Media, Ministry of the Environment, Public Organs and Civil Society. For each initiative submitted, the following criteria were used in the evaluation: effectiveness regarding species conservation, environmental and social impacts, and innovation.



PUBLIC RECOGNITION

As a direct result of the work carried out by Legado das Águas through programs and projects it partnered with local government as of 2013, the Tapirai city council awarded Public Recognition to Legado for its contribution to economic and socio-environmental development linked to conserving the Atlantic Forest in the municipality and throughout Vale do Ribeira (Ribeira Valley). At the event, Reserva also launched a book on the Cabocla community in Ribeiro da Anta which brings together the results of three years' research carried out together with the community.

“

The inhabitants of the Ribeão da Anta community were very generous in sharing their stories with us. The book is the result of this partnership, piecing together the cultural recovery of the community.

David Canassa, Director of Reservas Votorantim



From left to right: Warwick Manfrinato, Director of Protected Areas at the Ministry of the Environment; David Canassa, Director of Reservas Votorantim; Frineia Rezende, Executive Manager of Reservas Votorantim; Mario Mantovani, Director of Public Policy at SOS Mata Atlântica; and José Pedro, Secretary of Biodiversity and Forests at the Ministry of the Environment

Acknowledgement



WE EVEN APPEARED IN THE NEWS!

In 2017, Legado das Águas created a stir in both local and national media.

Regional

25 articles on web sites
7 spots on TV **2,876** minutes
61 printed articles

Reaching a possible readership of more than **9** million

SENSORIAL GARDEN AND ACCESSIBLE TRAIL

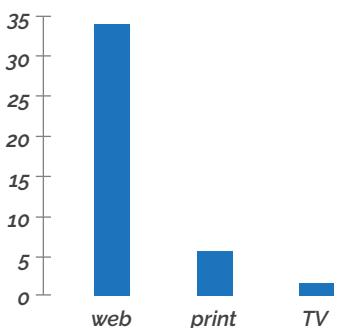
In December 2017, the Sensorial Garden and the Trail of the Centenary Fig Tree were inaugurated, offering accessibility to people with reduced mobility who, previously, were unable to find readily adapted ecotourism activities. They are now able to see a number of different Atlantic Forest native plant species from within the natural refuge.

The Sensorial Garden brings together 22 plant species with a variety of textures, including herbs, aromatics and native plants to the Atlantic biome, which highlight the sense of touch and smell. All plants are labeled in braille so that anyone, with whatever need, is able to appreciate them. Guides lead the visit which is done barefoot, allowing visitors to feel the different kinds of soil, sand, earth and rubber among others things.

Accessibility

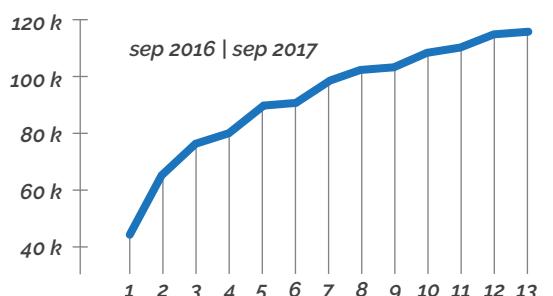
National

42 reports published on sites, in newspapers, magazines and presented on TV



ON SOCIAL MEDIA

Another area in which Legado das Águas showed considerable growth in 2017 was in the digital environment. Paulina Chamorro, journalist, explains, "Between September 2016 and October 2017, our Facebook audience increased by 154%. Last year, we decided to use more accessible language, closer to the way people communicate. The audience outside the state of São Paulo also grew including national interest topics related to environmental conservation in our posts." Paulina goes on to highlight that the year of Sustainable Tourism, celebrated in 2017, encouraged reflection on the need to conserve natural environments – precisely what we are doing at Legado das Águas.



410 posts

89,792 likes

42,338 new followers

11,760 shares



305 posts

28,763 interactions

IN 2017 LEGADO DAS ÁGUAS PARTICIPATED IN THE FOLLOWING EVENTS:

1st American Brazilian Scientific Seminar – Science and Citizenship

Sustainability and Governance Forum

Science and Technology Week in Vale do Ribeira

X Environmental Symposium

Environmental Week, Juquiá

Environment Conference, Juquitiba

Exhibition, Museum of the Brazilian Home

1st Meeting Hydrology in Forest Ecosystems, UFSCAR (University of São Carlos)

Eletrobras Workshop on Biodiversity and Eco-systems in Business Management

7th International Tapir Symposium

2nd Business and Investment Forum, SEBRAE

Conference of Parties – Germany

WORKSHOP: PHOTOGRAPHY IN THE FOREST

Fourteen photographers participated in this workshop, among them professionals and experienced amateurs. It was the sixth time this course had been held and it became one of the most sought-after events in by photographers of Brazilian nature. As well as training new talent to capture images of the Atlantic Forest, the course always offers its participants a new experience.



BASIC DIGITAL PHOTOGRAPHY COURSE IN THE ATLANTIC FOREST

This course was held for the first time bringing together 15 participants in an innovative initiative in photography classes outside the classroom. Reserva's inspiring surroundings served as a backdrop to spark students' interest in telling stories using pictures. The course was given by photographers Luciano Candisani from *National Geographic* magazine (Brazil) and William Silveira, partner at Legado and Director of the Applied Photographic Institute, Campinas, São Paulo.



photo: William Silveira



BASIC CONCEPTS IN ATLANTIC FOREST BOTANY

During the year, four expeditions to Legado das Águas were undertaken to provide an experience in botany in the largest private reserve of Atlantic Forest in the country. "In all, the workshop involved 44 participants from varied profiles between the ages of 25 and 34. Although they work in very different professional fields, what they had in common was a connection to botany and landscaping, as well as a love for trekking in the forest. It was a great experience," said Anderson Santos, Director of Pedagogy at Escola de Botânica (Botany School), a partner company responsible for the project. Among other subjects, participants were given a general overview of different groups of plants, their principal structure and organs, as well as concepts regarding physiology and plant morphology.



LEARNING MORE ABOUT SNAKES

Legado das Águas is situated in an area with several species of snake, some of which are venomous. Since 2016, Legado has had a partnership with the Butantan Institute in São Paulo. In addition to biological and behavioral research on the snake population, which includes amphibians and reptiles that inhabit the region, biologist and Director of the Institute Giuseppe Puerto took part, throughout the year, in a number of educational events, talks, courses and training sessions for the residents in the local communities, as well as townsfolk from Juquiá and Juquitiba.

Some of the subjects discussed were:

- Snakes as part of biodiversity;
- Venomous and dangerous species found in the area and the main non-venomous species;
- Activities, habitat, behavior, feeding habits and defense tactics;
- How to react when you come across a snake and how it should be handled, if necessary;
- First Aid.

ORCHIDS OF THE ATLANTIC FOREST

Luciano Zandoná, biologist, held further environmental educational activities. One brought together 11 people who experienced life in the forest for a whole weekend. In other activities, people were able to learn a little more about how to identify and cultivate certain plants. Zandoná also ran a number of educational activities with students from schools in the Legado area. For example, during Environment Week in June, he received some local children. "We did a number of activities with the kids, including planting trees and putting orchids back into the wild," he explains. ■

Courses
Workshops

BUDDING WEALTH IN THE NURSERY

It is hard to believe, but Brazil, whose diversity is one of the most notable on the planet, still hesitates to use native plants for ornamental use. This is because around 90% of species used for this purpose are not from any Brazilian biome, not even the Atlantic Forest, which originally covered a large part of our country. Fortunately, this is changing. One reason is that, since 2016, Legado das Águas has created a nursery dedicated to producing only seedlings native to the Atlantic Forest.

In the beginning, production was focused on seedlings from species used for reforestation. Now, the focus has changed to ornamental plants for the landscaping market. However, the nursery will continue producing plants for reforestation. Frineia Rezende, Executive Manager of Reservas Votorantim says, "We have seen that plants for ornamental purposes have added value. That is why we decided to rethink our strategy, enabling us to have a positive impact not only on restoration, but also on large-scale landscaping projects."

For this reason, the nursery needed to be restructured with the acquisition of new

IT PROMISES TO BE ONE OF THE MAIN NURSERIES WORKING WITH NATIVE ATLANTIC FOREST SPECIES FOR THE ORNAMENTAL MARKET. NOW, ALL SEEDLINGS ARE TRACEABLE, WHICH GUARANTEES THE BEST QUALITY FROM THE START TO THE END OF THE PROCESS

equipment and changes to work practices. If before seedlings of little more than a few weeks old were sold, now the plants needed to grow bigger and more resistant. Biologist Ricardo Cardim, a specialist in the use of native species in landscape projects, explains, "Now, the public will have the opportunity to take species native to the Atlantic Forest into urban environments. With this, people will once again have contact with species that originally existed in Brazil."

Among the other benefits, these plants attract birds, which also help reduce the maintenance costs in the landscape project as they feed on insects. In Legado's nursery, it is possible to find seedlings rarely found in other places, such as *carqueja arbustiva* (*baccharis tremera*), *manacazinho* (little manaca - *brunfelsia uniflora*), *orelha-de-onça prateada* (silver-leaved princess flower - *tibouchina heteromalla*), *cambuci* (*camponanesia phaea*), *uvaia* (*eugenia uvalha*), *guabiroba* (*campomanesia guaviroba*), *araçá* (guava - *psidium*), *juçara* (juçara palm - *euterpe edulis*), among others.



Focusing on ornamental species



The aim is to now produce bigger and more resistant seedlings

Nursery

PIONEERING TRACEABILITY

Another innovation was to automate production and trace seedlings from the parent plant all the way to the final customer. The idea of this project to improve nursery management came from the Innovation Committee at Votorantim S.A. A benchmark visit was paid to the GS1 company, a leader in bar code development, where the work began. Herbert Kanshiro, an analyst in sustainability at GS1 Brasil, recalls, "The project began when we suggested identifying the Atlantic Forest species. After that it developed into traceability." From then on, so that GS1 could deliver the complete solution, they sought other companies, such as PariPassu, Zebra Technologies and 3M, which also became partners deciding to participate as volunteers and collaborators, at no cost.

Frederico Bellini Coelho, Marketing and Sustainability Manager at GS1 Brasil, explains, "Legado's initiative aligned perfectly with GS1 Brasil's sustainability plan - the Brazilian Automation Association. We support it collaboratively through GS1 identification

standards, scalable projects that benefit society in the principle aspects of sustainability. Thus, the opportunity to innovatively connect the nursery with traceability in the environmental field motivated us to join forces with numerous partners all with the intention to preserve the Atlantic Forest, guaranteeing the identification of the seedlings, their origins and their entire history by means of automated information and technology." ■

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Unlike other existing general nurseries, the work at Legado's nursery was ground-breaking in producing ornamental native species. With this, it also fulfills its social role, allowing people to experience the Atlantic Forest again, albeit in an urban environment.

Ricardo Cardim, Botanist

THE FIRST FOREST RESTORATION PROJECTS

IN A LITTLE MORE THAN A YEAR OF ACTIVITIES, LEGADO DAS ÁGUAS NURSERY HAS ALREADY PROVIDED THOUSANDS OF NATIVE SEEDLINGS TO BE PLANTED THROUGHOUT THE STATE OF SÃO PAULO

Another important initiative taken by Legado das Águas in 2017 was to start commercializing native Atlantic Forest seedlings. This business model focuses on meeting the demand of companies or rural producers, who, for whatever reason, need to recover land.

Within this context, Legado's first client was Votorantim Cimentos, which, at the end of 2016, showed interest in changing the way it covered the slopes that are formed around its mining sites. "We developed pioneering reforestation efforts in partnership with a company called Bioflora on a site belonging to Votorantim Cimentos in the city of Salto de Pirapora in the interior of São Paulo state," explains João Dias, Coordinator at Legado das Águas.

The partnership between Votorantim Cimentos and Legado das Águas has proven to be highly relevant to the group's sustainability strategy. Through these two initiatives in reforestation areas, the use of nearly 20,000 native seedlings from Legado das Águas has made it clear that we can perform these activities in a coordinated fashion, bringing species that were once part of the Atlantic Forest.

In this way, everyone wins.

Álvaro Lorenz, Global Technical Director, Votorantim Cimentos

GABRIEL CHUCRE PARK

Votorantim Cimentos, in partnership with the São Paulo State Environment Secretariat and two private companies – Cardim Arquitetura Paisagística and Agroflor – also consolidated the second reforestation project, completed in October 2017. On this occasion, the nursery provided more than 10,000 seedlings to the Gabriel Chucré Park situated in Carapicuíba, within the Greater São Paulo area. "The idea of this sustainable urban landscaping is to work in regions which, in the past, were covered by Atlantic Forest. In this way, we want to bring back a bit of the original forest cover to São Paulo city. The forest that will appear in a few decades will leave an important legacy of environmental services, providing better standards of living for those who use the park," says Ricardo Cardim, botanist. ■

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Legado das Águas is a partner in search of solutions. Its work in reforestation and landscaping has proven to be a very promising business. It generates employment and restores the Atlantic Forest, including people and raising awareness as to the importance of this biome. Furthermore, it generates revenue to cover the maintenance of Reserva itself.

David Canassa, Director of Reservas Votorantim

Reforested area around a Votorantim Cimentos mine in Salto de Pirapora, SP.

Reforestation

LEGADO HOSTS THE LEGAL RESERVE FORUM

Legado das Águas covers a large area of preserved Atlantic Forest and, for this reason, it is able to offer interested parties (such as rural property owners) quite a different service. This difference is legal reserve compensation. Using this procedure, any landowners who do not own the percentage of legal reserve as required by legislation are able to normalize their situation, compensating with equivalent areas situated on other rural property. Hence, the name legal reserve compensation.

As not many parties directly involved know much about this procedure, Legado das Águas held a forum on "Legal Reserve Compensation: Models, Solutions and Benefits" in September 2017. It brought together the main players and specialists on the subject. Among those present were representatives from the São Paulo State Secretariat for the Environment, agribusiness

members (one of the most important sectors in Brazil's economy), as well as lawyers and representatives from the Banco do Brasil and Banco Votorantim.

"This forum was very important for all participants to better understand the details of the Forestry Code in relation to environmental compensation, allowing them to exchange knowledge. As well as discussing the main subjects in this field – such as resolutions handed down by the State Secretariat for the Environment, the application of economic tools as established in environmental legislation, and the requirements for granting credit to agribusiness – we also reinforced the services that Legado das Águas can offer to those interested parties, including legal support, for example," says Mayara Neme Mira, a lawyer at Reservas Votorantim.

A NATIONAL REFERENCE IN COMPENSATION

Another important point in the forum was that it showed the public that Legado das Águas means to be a national reference in legal reserve compensation, providing competitive advantages in relation to other companies offering the same service. Mayara adds, "One of these competitive advantages is the fact that we offer services in permanent monitoring and security throughout the area. Besides this, once our services have been acquired, support is provided to landowners to resolve any bureaucratic problems and they would be collaborating with Legado in its efforts to continue fostering the conservation of the Atlantic Forest biodiversity. This encourages development within the region with Reservas Votorantim's guarantee."

With issues related to the Forest Code resolved by the Superior Federal Appeals Court in 2018, Reservas Votorantim has increased the availability of this service, both in Legado das Águas, for the Atlantic Forest, and in Legado Verdes in the state of Goiás (see opposite). Resources from the legal reserve compensation services contribute to the upkeep of areas, under the premise of linking environmental protection to income generation, shared value and development of local communities.

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Reservas Votorantim offer areas for legal reserve compensation in the states of São Paulo and Goiás, with the guarantee of an entity which has been administering large, dense forests for more than six decades. Compensation in areas like Legado das Águas and Legado Verdes do Cerrado guarantees the protection of eco systemic services and forest maintenance along an ecological belt.

Mayara Neme Mira, Lawyer, Reservas Votorantim

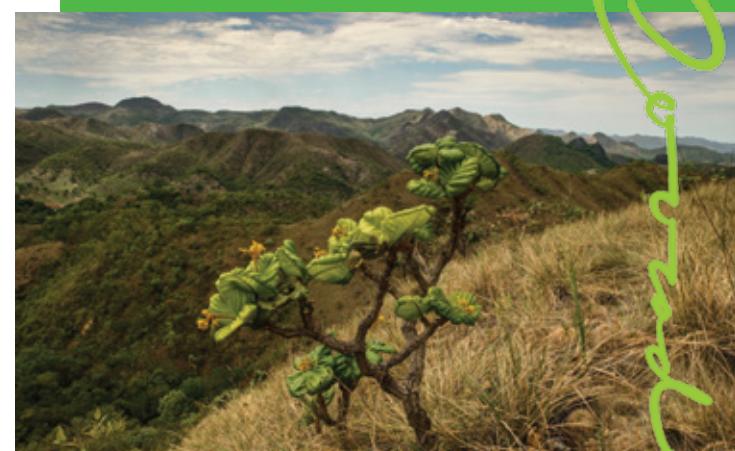


LEGADO VERDES DO CERRADO

As well as managing Legado das Águas, Reservas Votorantim has been managing another important environmental asset for just over one year: Legado Verdes do Cerrado. "This shows our capacity to expand the model we have developed to another environmental asset, with the security and knowledge of an entity administering areas like these for more than six decades," says David Canassa, Director of Reservas Votorantim.

Situated in Niquelândia in the state of Goiás, the Legado Verdes do Cerrado is a private reserve for the Sustainable Development of 32,000 hectares, an area belonging to the Companhia Brasileira de Aluminio (CBA), a Votorantim company. Of this total area, some 27,000 hectares have been protected since they were acquired more than 40 years ago. This has been fundamental in maintaining the Cerrado in an advanced state of conservation.

The area has become an open-air research laboratory for students and professionals who develop projects related to the Cerrado. It is also an environment for activities linked to the new economy – such as a native plant nursery, ecotourism and linked studies – sharing space with more conventional activities, such as planting soybean and raising cattle. Partner institutions for developing scientific research include the Federal University of Goiás, the State University of Goiás, the University of Brasilia, the Integrated Sesi-Senai Unit of Niquelândia together with other public and private institutions. ■



WATER MOVES THE WORLD

The Trata Brasil Institute is a Civil Society Organization for Public Interest (OSCIP) comprising companies that are interested in advancing basic sanitary conditions and the protection of the country's water resources. Édison Carlos, Trata's executive president, has analyzed the main issues related to the use of water and its importance to the balance of the planet. The Trata Brasil Institute has been a partner of Legado das Águas since 2017.

IN MARCH, BRASÍLIA WAS HOST TO THE 8TH WORLD FORUM ON WATER. WHAT DID WE LEARN FROM THIS EVENT, WHICH, FOR THE FIRST TIME, WAS HELD IN BRAZIL?

Carlos: This forum brought together the best minds working in sanitation and water from Brazil and around the world. There were dozens of renowned specialists presenting their visions on the needs that this country and the world face in relation to water. This subject always sparks interesting discussions, such as those concerning the conflict over the use of water, which historically take place in Middle Eastern countries, but which is now affecting Europe, the Americas and other regions. Another important point is climate change and the impact it has on historical rainfall patterns and the difficulty in planning because of this phenomenon. As the forum takes place every 3 years, what has changed between 2015 and now is that in many places throughout the world there has been an increase in technology for reusing water and desalination, among others. This has increased interest around the globe. In this matter, Israel, Australia, California and other areas have had important experiences. Unfortunately, Brazil suffers from an enduring lack of basic sanitation, an issue always debated with international



specialists. What we hope is that decisions taken here become more technical and less influenced by Brazilian politics. Basic sanitation and access to drinking water are infrastructure matters and, therefore, take decades to be resolved, but they have not been a priority for our leaders. This is all extremely important for Brazil to escape the status of being a "developing country" or, even worse, "a third world country". Once again, this is an enormous opportunity for Brazil to learn from countries that resolved the problem years ago, as well as to position itself in the world regarding the several opportunities we can take advantage of to effectively move towards universalizing water and basic sanitation.

Water generates electricity, balances the climate and the Earth's temperature. It produces food, turns the wheels of industry and quenches the thirst of human beings and animals. Therefore, there is nothing more important to discuss than water.

*Édison Carlos, Executive President,
Trata Brasil Institute.*

WHAT ARE THE MAIN ISSUES REGARDING WATER?

Water is what makes our world go round. It is what makes society function as well as our bodies. Without water there is no human activity. It is, therefore, easy to understand the importance of discussing the subject. Water generates electricity, balances the climate and temperature of the planet. It produces food, turns the wheels of industry and business and quenches the thirst of human beings and animals. Therefore, there is nothing more important to discuss than water. The big issue concerns distribution and access to fresh water around the world, as it is so irregular and even more uncertain due to today's climate. These uncertainties could well amplify the conflicts over water, which is very much a cause for concern.

IN THIS SENSE, WHAT IS LEGADO DAS ÁGUAS' IMPORTANCE IN PROTECTING THE JUQUIÁ RIVER SPRINGS?

The Juquiá River provides water for hundreds of people in the Vale do Ribeira region. It is vital to a sizeable part of the local economy, including fishing, agriculture, human use etc., but it is also responsible for generating electricity. It is well understood that conserving the Atlantic Forest and the local water resources, especially the Juquiá River springs, are results of work carried out by Votorantim, active in the area since the 1950s when it acquired land that, until today, is maintained intact. Legado das Águas, a division of the company responsible for maintaining and amplifying the region's environmental

and cultural assets, is a determining force in local conservation, mainly as a mediator for society and the local towns, in such a way that decision-makers understand the fragile balance between water and the environment. Among the challenges is that of raising awareness in the towns in terms of expanding basic sanitation since substandard waste collection and poor sewage treatment result in indiscriminate dumping of waste water in local rivers. Another challenge is to show the impacts of transferring water to the metropolitan region of São Paulo when technical and environmental parameters are not respected.

ONE OF THE AIMS OF THE MILLENNIUM DEVELOPMENT GOALS (MDGS) WAS TO REVERT THE LOSS OF ENVIRONMENTAL RESOURCES, HALVING THE PERCENTAGE OF THE POPULATION WITH NO ACCESS TO DRINKING WATER AND BASIC SANITATION BY 2015, AND, LASTLY, TO SIGNIFICANTLY INCREASE THE STANDARDS OF LIVING FOR AT LEAST 100 MILLION INHABITANTS OF DEGRADED NEIGHBORHOODS BY 2020. WHAT DO WE HAVE TO DO TO ACHIEVE THIS TARGET?

Start with the basics and planning. Brazil does not make long-term plans. We are held to the political agenda every four years. Infrastructure efforts require time and must be maintained, regardless of political parties or leaders. Therefore, it is incompatible to think in the short-term when talking about conserving environmental resources, increasing access to water and basic sanitation, expanding treatment stations etc., but, unfortunately, this is what we have seen over the past few years. The National Plan for Basic Sanitation (PLANSAB) put into effect in December 2013, sought to make basic sanitation available to everyone within 20 years, by 2033, similar to the targets set forth by the MDGs. However, progress over the last ten years has shown that this will not be possible. Sanitation needs not only to be seen as a long-term, technical matter, involving trained professionals to conceptualize projects, but also to have long-term resources from the federal government. Access to these services also needs to be free of bureaucracy. ■



A LEGADO FOR EVERYONE

Ecotourism

The year 2017 will always be remembered in Legado das Águas' history as the initial stage in the most important processes to feasibly turn Reserva into an area dedicated to ecotourism. After all, there are certainly enough attractions for anyone who has a connection with nature. Trekking, bird watching, cycling for several kilometers into the forest, the awe-inspiring beauty of the woodlands, and navigating the serene waters of the Juquiá River are just some of the options available.

"In 2017, we faced an important learning curve. We carried out a few experiments, such as **The Legado Experience**, and now, in 2018, we are going to build on what we have learned," says William Mendes de Souza, Ecotourism Analyst.

He continues, "Nothing like it is being done in any other private reserve. Neither the activities we offer here, nor the required infrastructures are available in other conservation areas. It is a challenging experience that we have made possible with the invaluable help of partner companies, such as Canoar, Sustentar, Velo Vert, Zoom Bike Park, Wild Life and the Manacá Institute."

“

In Brazil, nothing like it is being done in any other private reserve.

*William Mendes de Souza,
ecotourism analyst*

ACTIVITIES LINKED TO ECOTOURISM AND PUBLIC USE ALLOW MORE AND MORE PEOPLE TO DISCOVER THE LARGEST PRIVATE RESERVE IN THE ATLANTIC FOREST, IN BRAZIL

Other achievements from 2017 were in relation to the infrastructure for visitors. New furniture for the bedrooms; the cafeteria was enlarged; and first aid facilities were installed. Souza adds, "To enable us to offer better security to visitors, we have also developed contingency plans for each activity carried out at Legado."

Main Activities in 2017

Public Use

Opening up Mountain Bike tracks and inaugurating six other tracks between 8km and 78km long.

Legado Experience

- Visit to the Nursery and Orquidarium;
- Visit to the Cambuci Trail;
- A boat trip along the Juquiá River.

Main objectives of the Ecotourism activities in Legado das Águas

- Income generation and shared value;
- Environmental conservation support;
- Encourage the connection between general and scientific knowledge.

Prospects for 2018

- Mountain Bike: to complete works so that the wooden track is ready for public use;
- Train the teams for the biking and kayaking trips;
- Train more people in bird watching and mountain climbing;
- Improve direct operations and those with partners;
- Open the Reservation Center.

A STRONG PRESENCE IN ENVIRONMENTAL EDUCATION

"In 2017, we took part in a number of activities for elementary students in Miracatu and Juquiá. We were also present in events in other cities and a number of schools came to Legado das Águas for environmental studies throughout the year. The plan for 2018 is that all of this happens more frequently, allowing greater integration between students and nature," says Elaine Izabel de Moura, Environmental Educational Analyst.

MAR World Water Day Celebrations: Schools in Juquiá held a week of activities;

JUN During the 1st Environmental Week, the Olympic Village and an old people's home in Juquiá, the *Centro de Convivência dos Idosos*, hosted talks by some of the researchers from Legado as well as a photo exhibition;

AUG e OCT Talks on snakes and refuse in the Ribeirão da Anta community;

SET Some 54 pre-school and elementary students from the Serraria School visited the nursery, the orchidarium, the Porto Raso reservoir and the Barra hydroelectric dam.

They also attended the 2nd School Conference on the Environment in Juquitiba;

OCT During the Science and Technology Week at the Federal Institute in Registro, there were lectures on Legado that attracted over 200 people. A 360-degree film about Reserva was also shown.

Visits to Legado

Escola CLQ from Piracicaba, The American School from Campinas; Escola Arteris including students, teachers and the local population from Serra do Cafetal; University of Atibaia; Colégio do Carmo. Total: more than 210 people.

Partnership established with three environmental educational agencies: *Ivian*, *Quiron* and *Araribá*.

CHALLENGES AND ACHIEVEMENTS THROUGHOUT THE UNITED NATIONS' DECADE OF BIODIVERSITY

by Braulio F. de Souza Dias

Unfortunately, the main threats to biodiversity still exist all over the planet; all of them are a result of the impact the growing human population—unsustainable production systems, unsustainable consumption, over-exploitation of forest resources and fisheries, air pollution, water pollution and contaminated soil, deforestation, forest fires and the introduction of invasive foreign species. Besides the impacts caused by climate change, such as global warming, rising sea-levels, acidification of oceans, extreme climatic conditions are becoming more frequent and more intense. If we are unable to revert this, scientists are predicting that one third of plant and animal species could become extinct in the coming decades¹. The world has already lost 90% of all humid areas, 50% of forests, more than 80% of the Atlantic Forest, around 70% of Pampas 50% of Cerrado and Caatinga, and more than 80% of the world's fishing grounds are over-exploited. We are consuming more than the planet can sustain, and this increasing human consumption is at the expense of the needs of other animal and plant species we share the world with². And why should we concern ourselves with this loss of biodiversity?³

In 2016, Edward Wilson, a professor at the University of Harvard, published his book, *Half Earth, Our Planet's Fight for Life*, in which he puts forward the idea that man should leave at least half the Earth for the other species in the planet's biodiversity. In 1992, in Rio de Janeiro, all countries of the world came together to approve the United Nations' Convention on Biological Diversity (CBD). In 2010, in Nagoya, Japan, the countries came together again in the 10th Conference of Parties (COP) of the CBD in order to approve a Strategic

Plan for Biodiversity for the 2011-2020 period, including the 20 Global Biodiversity Objectives (known as the Aichi Biodiversity Targets). In the same year, a general meeting at the UN approved a resolution that designated 2011-2020 the UN's Decade of Biodiversity. In 2015, the UN general meeting approved the 2030 Sustainable Development Agenda and its 17 Sustainable Development Goals, which incorporated many of the Aichi Biodiversity Targets.

BUSINESS ENGAGEMENT

The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) was created in 2012, and in February 2016 it approved its first detailed specific evaluation on the decrease of pollinators and pollination and the enormous implications on agricultural production and food security. In December 2016, at the COP 13/CBD in Cancun, Mexico, decision XIII/15 was approved, calling on all governments and government agencies to introduce public policies, rural extension and training to reverse the decline of pollinators and the pollination deficits caused, among other reasons, by the excessive and inappropriate use of agrochemicals and by fragmentation and degradation of natural and semi-natural ecosystems. Another important decision, XIII/3, was also approved at COP 13/CBD, calling on all countries and agents to incorporate biodiversity management practices into their farming, cattle-raising, forestry, aquafarming and fisheries. To obtain a more in-depth understanding of the advances, or lack of, in the implementation of these targets, I recommend reading two texts⁴.

The challenges are immense, but we are slowly making progress. Only by engaging the entire society will we succeed. We are all literally in the same boat, and companies are fundamental players.

Braulio F. de Souza Dias, professor of Ecology at the University of Brasília and former Executive Secretary at the UN Convention on Biological Diversity



In August 2010, a number of Brazilian businesses and organizations created the Business Movement for the Protection and Sustainable Use of Biodiversity, committing themselves to eight specific targets related to Brazilian biodiversity⁵. In June 2012, during the UN Conference on Sustainable Development (Rio +20), under the auspices of the CNI (National Confederation of Industry) in partnership with the Brazilian Business Council for Sustainable Development (CEBDS) and the Life Institute, the Brazilian Initiative for Business and Biodiversity was launched⁶. This and other initiatives lie

within the context of the Global Platform for Business and Global Biodiversity⁷ presented in Tokyo in 2011 in order to align the business sector with objectives and targets of the Strategic Plan for Biodiversity for the years 2011-2020, as well as implementing the UN's Decade for Biodiversity, 2011-2022.

There are currently more than 20 national or sub-regional initiatives in business and biodiversity in the world. During the last COP/CBD in Cancun, Mexico, in December 2016, an invitation was sent to the world's companies to join the Business and Biodiversity Commitment⁸. More than 100 business organizations have already committed, including Votorantim⁹. Important steps taken on this path include amplifying national initiatives in business and biodiversity, the Capital Natural (Natural Capital) initiative¹⁰, the initiative to encourage company's to dedicate more space to biodiversity in their reports, and the initiative to include impact indicators in commodity production.

The contribution made to conserving biodiversity by Brazil's private sector includes creating and managing private reserves like Votorantim's Legado das Águas, maintained by mining companies, paper and cellulose producers, and other sectors. The creation and management of RPPNs¹¹, are also included, as well as conserving and recuperating the APPs as foreseen in the Forest Code, in addition to conservation and sustainable use of legal reserves as established in the same code. The data from the Rural Environmental Register, although incomplete, show the scale and the importance of these private areas in conserving native ecosystems in Brazil. Besides this, a number of businesses finance biodiversity conservation projects, especially those involving threatened species. Petrobras is one such business. The Foundation O Boticário de Conservação da Natureza¹² has already financed more than 1,500 projects in Brazil in more than 25 areas of expertise.

The challenges are immense, but we are slowly making progress. Only by engaging the entire society will we succeed. We are all literally in the same boat, and companies are fundamental actors. ■

1. 5th Evaluation Report of the International Panel on Climate - IPCC (ipcc.ch/report/ar5); **2.** Global ecological footprint calculation and countries (<https://www.footprintnetwork.org/our-work/ecological-footprint/>); **3.** "Biodiversity. Because it Matters!" published in 2017 in Cause magazine nº 5 (subject Nature): pp.94-100 ([cause magazine.com/conteudo/2017/8/15/biodiversidade-por-que-importa/](http://causemagazine.com/conteudo/2017/8/15/biodiversidade-por-que-importa/)); **4.** 4th Report on Biodiversity's Global Panorama (cbd.int/gbo4) and 5th National Report of Brazil for the CBD, vol. 50 in the series on Biodiversity / Ministry of the Environment Publications (mma.gov.br/publicacoes/biodiversidade/category/142-serie-biodiversidade); **5.** mebbrasil.org.br; **6.** ibnbioc.org; **7.** cbd.int/business; **8.** cbd.int/business/pledges.shtml; **9.** cbd.int/business/signatories-and-supporters.shtml; **10.** naturalcapitalinitiative.org.uk; **11.** rppnweb.com/site/index.php/cnrppn; **12.** fundacaogrupoboticario.org.br.



the *Mirrored* *River*

In 2017, as has been the case over the last six years, through his sensitive eye for detail, photographer Luciano Candisani, a partner of Legado das Águas, set himself the goal of capturing the most impacting and surprising images within this region, which represents one of the most important remaining areas of Atlantic Forest in Brazil.

This image, for example, captures its emblematic beauty. It shows the serene waters of Juquiá River, which divides Reserva in two, almost equal, halves, descending into a never-ending mass of forest. In the middle of this dense vegetation, we find several species native to the Atlantic Forest. It is not unusual to find trees more than 30 meters high; specimens of *jatobás* (*hymenaea courbaril*), *jequitibás* (*cariniana*), *ipés* (*tabebuia*), *perobas* (*aspidosperma polyneuron*) and *canelas* (*canella winterana*) which, apart from producing flowers and fruits, have other important ecological functions.

Bromelias (*bromeliaceae*) also grow in Reserva, as well as orchids, alongside a huge variety of fruit-bearing species, especially *cambuci* (*campomanesia phaeal*), a tree which is becoming increasingly rare in urban areas. ■

THE ORCHID PROTECTOR



Luciano Zandoná has been a partner with Legado das Águas since 2015. He is one of those researchers who transform their work into a passion. Always dedicated, his eyes sparkle when he talks about conserving the biodiversity of the Atlantic Forest, especially orchids. The biologist tells us, "If the Atlantic Forest is threatened, orchids are, too." It is a fact that, in Brazil, only around 7% of the original biome still exists, and, therefore, orchids are also disappearing from their natural habitat. Unfortunately, this is a reality that extends throughout most of the country.

In the 31,000 hectares that comprise Legado das Águas, fortunately the scenario is different – and far better. There, they are safe and very

well protected, thanks to Zandoná's work. He has been a partner-researcher with Legado since 2015. In just over two years with Legado, he has already catalogued 208 species growing in Reserva: 12 have been registered as endangered. "One of them was actually considered extinct in the state of São Paulo fifty years ago," he tells us.

The species in question is the delicate and beautiful orchid which goes by the name of *octomeria estrellensis*. "We managed to find a specimen of this plant and send it to a laboratory. Now, because of this particular orchid, our aim is to set up a genetic bank for the species. Because it is fragile, we need to handle it with special care," Zandoná explains.

NO EFFORT IS SPARED WHEN THE INTREPID BIOLOGIST LUCIANO ZANDONÁ IS OUT TO RESCUE SAMPLES OF ONE OF THE MOST FRAGILE AND ENDANGERED PLANTS IN THE ATLANTIC FOREST. HIS DEDICATION IS ALSO RESPONSIBLE FOR FINDING A SPECIES THOUGHT TO BE EXTINCT IN SÃO PAULO FOR MORE THAN FIFTY YEARS

In 2017, Zandoná was responsible for:

<big>100</big> <big>208</big> <big>12</big> <small>1</small>	days of field activities in Legado list species endangered considered extinct in São Paulo for more than 50 years
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Octomeria estrellensis in its natural habitat. Also, the Botanical Institute of São Paulo's index card showing the species present in Legado das Águas



600 RESCUES IN THE FOREST

While walking along Legado's tracks, Zandoná keeps his eyes on the trees which have fallen naturally, mainly due to the heavy rains that are common in the area. The rain soaks the soil and makes the canopy extremely heavy. When he sees fallen trunks and branches, Zandoná and Angelica Guidoni, his workmate, swing into action. It is almost certain that they will find orchid species that would surely die if they were not collected from these fallen trees.

Taking every precaution, he then isolates the plant from the tree and takes it back to the orchidarium, located next to the nursery. There, the orchids receive the appropriate care to fight any fungus and bacteria. They are fed and watered daily. Once they are back to being healthy, they are relocated into other trees deep within the forest. Over time, they will bloom and perhaps even be pollinated, meaning that their descendants will thrive in other parts of Legado. Over the past two years, around 600 plants have been rescued, which, had it not been for Zandoná, would have died in the middle of the forest. ■



A species of orchid which was rescued and relocated to another tree

THE STRONG RELATIONSHIP BETWEEN RIVERS AND OCEANS

by Luciano Candisani*

Science has issued the following warning: it is impossible to consider conservation of the oceans separate from the strong influence they are under from the drainage basins that are spread across the planet. In the time it has taken to write these few lines, the Amazon River has deposited something close to 2 million liters of water into the Atlantic Ocean, which has also received around 170,000 liters from the Mississippi River in North America.

Elements that are fundamental to the biochemical balance of the marine environments travel in these and in many other huge masses of fresh water together with some of the most significant threats to the balance of life in our seas. The same water that carries nutrients to seaweed, algae, sea grass (flowering plants) and microorganisms, can also carry excess sediments and devastating, polluting chemicals.

Working as a photographer specializing in environmental subject matters, conservation and traditional populations, I have had the opportunity to get to know, up close, many different examples of the impact rivers can have on the marine environment in various parts of the world. One of the most emblematic experiences that I have ever had was the Costa dos Corais (Coral Reef), situated between the states of Alagoas and Pernambuco. I was traveling through the region to document the life of a critically endangered marine creature – the manatee or sea cow. The trip involved several weeks of trekking with a team of biologists from the Itamaracá Island Aquatic Mammal Center, in Pernambuco. While I was searching for this extremely rare animal (there are only around 500 of them left, according to

OCEANS RECEIVE ALL OF THE SEDIMENT AND POLLUTION CARRIED ALONG BY RIVERS. FOR THIS REASON, MARINE CONSERVATION DEPENDS ON THE PROTECTION OF SPRINGS, FORESTS AND WATERCOURSES

most estimates), I dived into various estuaries in the region – estuaries are the preferred habitat of this 4-meter-long marine mammal. My aim was to photograph the efforts being made to avoid the extinction of this species in Brazilian waters.

DESTRUCTION OF MANGROVE SWAMPS AND FORESTS

The main obstacle to conserving the tiny remaining manatee population is connected to the destruction of mangrove swamps and coastal forests. Without the protection of the mangroves, the female manatees are forced to give birth to their young in open, turbulent waters. Not having the strength to resist the currents of the water, the newborns are caught up in the waves and end up stranded or beached. In addition, the excess sediments carried by the rivers kill off the coastal marine



The meeting of the Tatuamunha River with the Atlantic Ocean, in the State of Alagoas; habitat of the threatened manatee

feeding grounds where the adult manatees eat. I see a similar situation here where I live – near the island of Ilhabela, just off the north coast of the state of São Paulo. A few decades ago, the water in our many rivers used to flow crystal clear into the sea, even during the heavy rains. We would swim in a translucent sea, even up to the channel that separates the island from the mainland. We rarely saw murky seawater. The situation today is quite the opposite. Because of the intense urbanization and the lack of soil infiltration, coupled with deforestation for illegal land occupation, an enormous quantity of sediments infiltrate the rivers with each heavy rainfall, meaning the channel's blue water takes on that unmistakable murky color of mud. Even worse, domestic wastewater coming from poorly built septic tanks is dumped together with the

sediments. The situation is even more ominous in neighboring towns. In the vast area of Ilhabela facing the open ocean, however, a state park has protected the forest since 1977. This prevents flooding and reduces the huge quantities of sediments flowing into the rivers.

Cases like these clearly show what science has already demonstrated through statistics and analyses: that marine conservation is dependent upon the protection of forests, mangroves and rivers. ■

* Luciano Candisani is a biologist and photographer for *National Geographic* magazine, among other publications. He is the winner of a number of international awards, such as *Wildlife Photographer of the Year*, 2012, and is a member of the International League of Conservation Photographers (ILCP).

A LABORATORY IN THE ATLANTIC FOREST

Have you ever thought about the possibility of studying and watching nature in a gigantic laboratory measuring 31.000 hectares? Well, many scholars have had precisely this stroke of luck and are reaching excellent results. Over the next few pages, you will get to see some of the main advances in the research carried out at Legado das Águas and what has been done in terms of environmental monitoring to make the area safe and sound from environmental threats.



Researcher Mauro Rebelo with a sample of the product developed from micro-organisms which have been modified using the genes of a species found in the Atlantic Forest

BIOTECHNOLOGY

One of the most promising lines of research at Reserva is biotechnology, through genetically mapping plants in Legado das Águas and the compound transformations. In 2017, an important milestone in the development of products and services was based on Legado's biodiversity. Mauro Rebelo, teaching assistant at the Biophysics Institute at the Federal University of Rio de Janeiro (UFRJ) and head of the Environmental Molecular Biology Laboratory explains, "We have managed to produce two substances which have sparked the interest of the cosmetics industry. They are 1,2 Diol-Limoeno and alfa-terpineol, both derived from r-limoneno, a sub-product of the orange juice industry. We used modified microorganisms with genes taken from species found in the Atlantic Forest. Although it has only been a few microliters, this has been important proof of concept for us to gain new partners and financing to upscale this process."



JAGUARS & PUMAS

The year 2017 also held pleasant surprises for the team at the Conservation Institute for the Neotropical Carnivores (Pro-Carnivoros) which is coordinated by Ecology PhD Sandra Cavalcanti. By means of traps laid in the forest, it was possible to capture both a jaguar and a puma, both in areas surrounding Legado. "As there had already been several sightings of these animals, the local population alerted us. We were very soon able to understand why they were in the area, and we made attempts to capture them," Sandra explains. "In the end, everything went well. After a few attempts, we managed to capture them and put a radio collar on each one."

Jaguars

With this equipment, it is possible to monitor them using GPS. That way, their habits and behavior can be better understood; the areas they inhabit, which paths they take and where they go. "We already know that they inhabit an area within a radius of about 80 kilometers. And as they are opportunistic animals, they prefer areas where they can find lone animals that are easier to hunt," Sandra adds. With this data, it is now easier to clarify other doubts regarding these animals.

Sandra Cavalcanti and her team are trying to better understand the behavior of jaguars that inhabit the Atlantic Forest



LIVING FOREST

TAPIRS

Between November 13th and 18th, 2017, the Tapirs at Legado das Águas made their presence felt during the 7th International Tapir Symposium held in Houston, US. It brought together more than 80 experts from 20 countries – specialists who have dedicated themselves to studying these animals. Among the Brazilian representatives was Mariana Landis, president of the Manacá Institute, another partner institution. She spoke about the management model at Reserva and the research carried out there. Among other points, Mariana showed the area occupied by Legado das Águas, the famous albino tapir, the areas inhabited by the tapir, and the challenges in conserving this species.

"Since August 2016, we have been constantly monitoring the existing fauna within Legado by means of photographic traps hidden in the forest," Mariana explains. Between January and December 2017, for example, 1,178 large mammals were photographed. The tapir was the

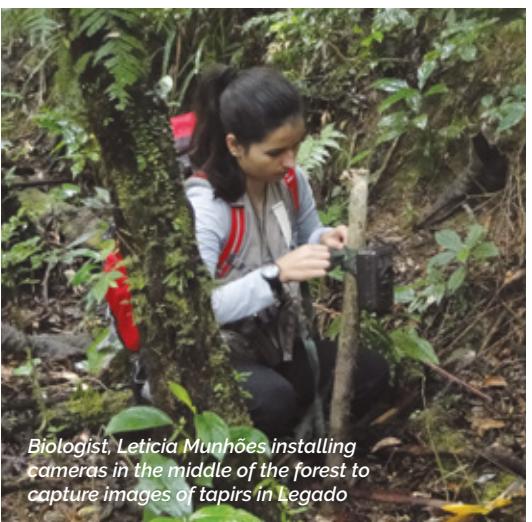
most common – 26% of all images. "This means that the area is highly populated with tapirs," Mariana adds. The animals are relatively protected at Reserva, but outside these borders, there are enormous challenges mainly because of illegal hunting. Mariana finishes off by saying, "For this reason, it is still important that we continue to work hard in environmental education, to reduce this impact."

An interesting fact is that as these photographic traps capture movement made by any animal. The research also offers information on other animals such as the *tayra*, the bush dog, *tapeti*, as well as another seventeen species.

Monitoring the tapir in Legado das Águas is raising academic interest among the students at some respected universities, such as the Escola Superior de Agricultura Luiz de Queiroz at the University of São Paulo (USP).



Mariana Landis, President of the Manacá Institute at an event in Houston, US, in November, 2017



Biologist, Letícia Munhões installing cameras in the middle of the forest to capture images of tapirs in Legado



Biologist, Laura Braga and her butterfly net

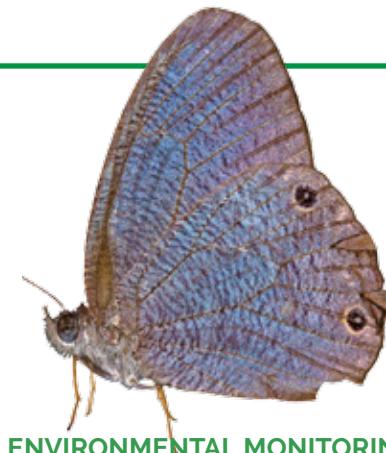


Members of the team responsible for Reserva's security

BUTTERFLIES

Studies involving butterflies also took great strides forward in 2017. "By the end of the year, we had registered 182 species. In 2016, we had 65," says Laura Braga, a biologist and PhD in ecology as well as a specialist in Lepidoptera. Together with her team, she has already conducted four collection operations inside Legado. The good news is that, among the species registered, there was one that had never before been registered in the state of São Paulo: *godartiana byses* (see photo). "It is a very rare species, endemic to the Atlantic Forest and an important indication of well conserved forests", Laura explains. This finding of important scientific interest generated the publication of an article in the *Journal of Lepidopterists' Society*, one of the most renowned scientific magazines in the field.

"The study on butterflies in Legado is important for us to discover which species frequent the area and if there are any rare or endangered species. With this information, we are able to develop a management and conservation plan. In addition to this, butterflies are strong indicators of the environmental quality, especially the state of conservation of the Atlantic Forest vegetation within Legado das Águas. In other words, the richer and wider the diversity of the species, the better the state of conservation the butterflies inhabit," Laura adds.



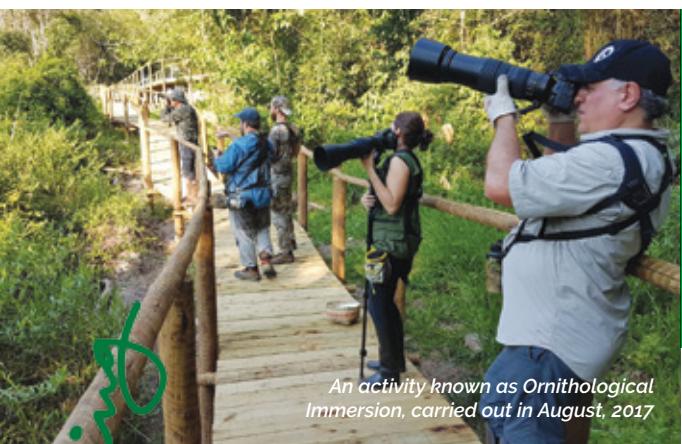
ENVIRONMENTAL MONITORING

Legado das Águas is situated in a region which has one of the lowest Human Development Indexes (HDI) in the state of São Paulo. This, together with the lack of "environmental awareness" on the part of many people means that the whole Vale do Ribeira region, in the southern part of São Paulo state, has a history of illegal hunting and palm tree felling. "We are aware that, for the time being, it is impossible to avoid this, but we are working towards reducing such aggression toward the environment as much as possible," says Rodrigo Inojosa de Oliveira, Manager of the Operations, Maintenance and Administrative Services at Legado das Águas. Environmental monitoring is responsible for the area's security. "Each month, the teams make the rounds along Legado's perimeter as well as monitoring the internal tracks, checking for signs of hunters or palm fellers. Any incidents are photographed and, when necessary, the environment police are informed," Inojosa comments.

Godartiana byses

SCIENCE IN THE SKY, ON LAND AND IN THE WATER

bird watching



An activity known as Ornithological Immersion, carried out in August, 2017

While walking along the pathways that run through Legado das Águas, people do not know whether to look up to the sky, down at the ground or straight ahead at the thick forest full of colors and enchantment. At the end of the day: it depends on what you are interested in, there is plenty to see in all directions. In fact, this has been one of the most peculiar research projects developed at Legado. Quite often, specialists get together on field trips, exchange ideas, share results and study methods. After all, they all have the same interest: to discover and better understand the Atlantic Forest's biodiversity.

“

The year 2017 was one in which we were able to put our bird-watching operations to the test. We did this by promoting and running events. We tested different kinds of activities, combining bird-watching walks with workshops.

Wagner Nogueira, ornithologist

LEGADO DAS ÁGUAS HAS BECOME A VERY SPECIAL PLACE TO OBSERVE RARE BIRDS AS WELL AS STUDYING SNAKES AND AMPHIBIANS

BIRDS

A living forest in an advanced stage of conservation, full of trees of 30 meters or more and thick vegetation, where significant relationships between living creatures still exist, is one of the few places capable of sheltering the most diverse animal species, many of them endemic to the biome. Birds are among these species and have been a focus of study by a number of ornithologists, who, before sunrise, are already in the field, looking skyward searching for the rare species, seldom seen in other parts of the country.

“In 2016, there was a list of 287 observed species. In 2017, this had increased by four, reaching 291. The number of endemic species continues around the 40% mark,” informs Wagner Oliveira, an ornithologist from Sustentar, the partner organization responsible for this work and for organizing public bird-watching activities. These activities, too, have increased over the past two months. “The year 2017 was one in which we were able to put our bird-watching operations to the test at Legado. We did this by promoting and running events. We tested different kinds of activities, combining bird-watching walks and workshops.”



Bufador woodpecker (*Piculus flavigula*), one of the most beautiful birds at Legado das Águas

Wagner points out that there were five events throughout the year. The main event was the Ornithological Immersion, which was made up of a day of walks and workshops on ornithology and bird watching, lead by renowned specialists. “This was one of the events that we enjoyed most. We are sure that 2018 will attract the public even more,” Wagner adds.

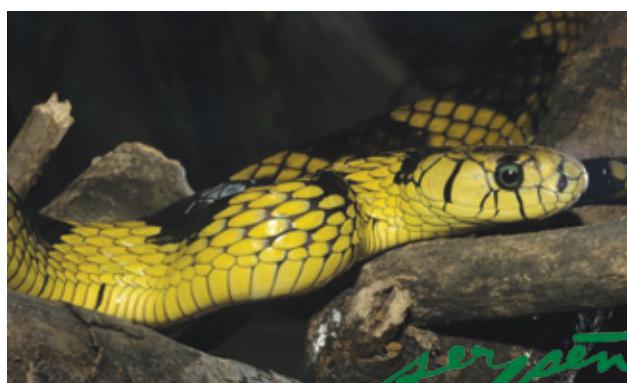
HERPETOLOGY

They are not the friendliest of creatures, not to the general public, at least. In fact, there are still lots of people who are scared of them, probably due to a lack of information or because they do not know how to react if they come across one. In spite of this, snakes are also part of the biodiversity. They have their role to play in the biome and deserve to be studied under the watchful eye of science.

“Snakes are not overly popular. Our activities serve to show that, even though some of them are dangerous, these animals deserve respect in all its forms. Mainly because they are living creatures.

Giuseppe Puerto, biologist, specialist in herpetology and Director of the Biology Museum at the Butantan Institute

“In 2017, we did the field work, listed the different species and released a lot of scientific information. In total, eight campaigns, in different areas of Reserva, in all four seasons,” explains Giuseppe Puerto, biologist and Director of the Biology Museum at the Butantan Institute, says. Marcelo S. B. Lucas and Adriana Mezini are also members of the team at the Butantan Institute, which has been a partner of Legado since 2016. “We have discovered twelve species of snake; three of them venomous, the most common being the *jararacuçu* (*bothrops jararacussu*), and nine non-venomous, the *caninana* (*spilotes pullatus*) being the most common. We also recorded four species of lizard and one turtle (*cágado-da-serra*). We were also able to observe a further 34 species of amphibians divided into nine families. Although they were found in a number of areas within Legado, two particular areas were noted for the number and variety of species: the Barra Quarry (*Pedreira da Barra*) and the Cambuci Trail. The marked presence of amphibians represents an excellent bio indicator for the quality of the environment in the region,” Giuseppe Puerto concluded. ■



*serpentes
amphibians*

YELLOW FEVER AND PRIMATES

DURING 2017, THE NUMBER OF CASES OF THE DISEASE INCREASED IN BRAZIL, ESPECIALLY IN THE STATES OF SÃO PAULO AND MINAS GERAIS. BUT WHY DID THIS AND OTHER TROPICAL DISEASES REAPPEAR, SCARING THE POPULATION AND KILLING A NUMBER OF MONKEYS IN OUR FORESTS?

Those who followed the news headlines in 2017 will not be able to forget the reports of people being vaccinated for yellow fever in clinics all over Brazil, but especially in the Southeast region. The motive was clearly justifiable. Many of these people lived in high risk areas, near thick forests – the perfect environment in which to be bitten by the mosquito that transmits the disease. People's worries were understandable. After all, the Ministry of Health had disclosed some data between July 2017 and the end of January 2018 which showed that there had been 213 cases of yellow fever, including 81 deaths related to the disease transmitted by the *haemagogus* and

sabedes mosquitoes. It is worth noting that urban yellow fever, transmitted by *aedes aegypti*, the same mosquito that transmits dengue fever, was eradicated from Brazil in 1942.

ANIMAL SENTINELS

But what could have happened to cause this disease to return to infect so many Brazilians, especially those who live near forest areas? "We are still trying to find more definitive answers that could explain the outbreak of yellow fever that has occurred in Brazil. This is linked to the natural transmission cycle which occurs endemically in the Amazon, but which has been expanding into other regions since 2014. Entire populations of howler monkeys, one of the most sensitive species to the virus, were wiped out in the State of Minas Gerais, in 2017. It is the single largest ecological tragedy to hit primates recorded in the history of the Atlantic Forest," says Luis Paulo Ferraz, Executive Secretary of the Associação Mico-Leão-Dourado (AMLD, Golden Lion Tamarin Association), situated in Silva Jardim, in the state of Rio de Janeiro.

It is true that "among the common howler monkeys and the brown howler monkeys, almost 90% of infected animals end up dying. This does not mean that they are good hosts for disease.

Almost 90% of the infected common howler monkeys and brown howler monkeys end up dying. They are victims of the disease. When these deaths occur, it is a warning sign for the human population to immediately seek vaccination.

Fabiano R. de Melo, Professor at the Federal University of Goiás, Jataí region, and Visiting Professor at the Federal University of Viçosa



Yellow fever is a serious threat to the work we have been doing. If what happened to the howler monkeys in Minas Gerais happens to the golden lion tamarin, the entire population could be wiped out. If this were to occur, the pioneering efforts made from 1984 to 2000 of reintroducing animals from zoos to save the species would have to start from scratch.

Luis Paulo Ferraz, Executive Secretary of the Associação Mico-Leão-Dourado (AMLD)



Among the probable factors responsible for spreading tropical diseases is the disappearance of the mosquitoes' natural predators. The death of the Doce River, for example, might have devastated a large part of the food chain of the macro region, creating the conditions for a proliferation of mosquitos. Furthermore, there is much misinformation and a lack of awareness on the part of the general population.

Mauricio Talebi, Professor of Environmental Science at the Federal University of São Paulo and Coordinator of the Woolly Spider Monkey Project (Projeto Muriqui) in Legado das Águas



It means they are its victims. When these deaths occur, it is a warning sign for the human population to immediately seek vaccination, in order to provide prevention and protection in the face of spreading yellow fever. In other words, monkeys do not transmit the disease; in fact, they help us prevent it," explains Fabiano R. de Melo, Professor at the Federal University of Goiás, Jataí region, and Visiting Professor at the Federal University of Viçosa in the State of Minas Gerais, member of the Deliberative Counsel of the Muriqui Instituto de Biodiversidade (MIB, Muriqui Institute of Biodiversity), as well as a partner at Legado das Águas. "Thankfully, the number of deaths among other primate species, such as the woolly spider monkey and marmoset, are considerably lower, between 10% and 30%," Fabiano points out.

PROBABLE CAUSES FOR THE DISEASE

Although we do not know for sure the main reasons causing the increase in yellow fever, there are some important indications. "Not only in Brazil, but in South America and in other tropical areas, yellow fever and other diseases have been spreading because of the increase in deforestation and environmental degradation. The pressure that has been put on the natural habitat has led to the release of a number of diseases which, beforehand, were limited to wild areas. Besides this, there is the growth in the human population leading to more contact with wild species," Professor Fabio adds. Luis Paulo, from AMLD, comments that, "It is highly likely that deforestation and the use and disorderly occupation of land has contributed to spreading the disease."

Mauricio Talebi, Professor of Environmental Science at the Federal University of São Paulo and Coordinator of the Woolly Spider Monkey project (Projeto Muriqui) at Legado das Águas, believes that there could be other factors responsible for spreading these tropical diseases. "Among them is the elimination of the mosquitoes' natural predators. The death of the Doce River, for example, might well have devastated a large part of the food chain in the macro region, creating the conditions for a proliferation of mosquitos. Furthermore, there is much misinformation and a lack of awareness on the part of the general population," Talebi adds.

According to Luis Paulo Ferraz, unlike the howler monkeys in Minas Gerais, there has been no confirmed case of any golden lion tamarin being infected with yellow fever, up until now. The Executive Secretary of AMLD, reports, "Some of the dead animals we found were taken for examination, but fortunately the disease was not found. What did occur were two isolated cases of animals being killed through human ignorance. The animals' bodies were taken to the Health Surveillance Authority with severe fractures and evidence of violence." Through communication means, on social media and other actions taken, Luis Paulo has tried to raise the local population's awareness with regard to the mistake in killing these animals instead of recognizing that they are important 'sentinels' against the disease. At the end of the day, they are as much victims of yellow fever as we humans are. ■

SOCIAL EFFORTS

Legado das Águas is not an island. It is situated in a region where the lowest HDI in the state creates a number of serious challenges for society. One of Reserva's missions is to serve as a catalyst for social and economic initiatives that contribute to the development of the local area, considering that regional development is a pre-requisite for the activities performed by Reserva.

IT IS NOT ENOUGH FOR LEGADO DAS ÁGUAS TO SIMPLY FOCUS ON WHAT IS HAPPENING WITHIN ITS BOUNDARIES. IT NEEDS TO LOOK BEYOND AND OFFER SUPPORT, KNOWLEDGE AND TOOLS TO THE LOCAL TOWNS, SO THAT THEY TOO CAN GROW AND DEVELOP

In 2017, social projects accounted for 7.7% of all investments made in Legado das Águas.

For this reason, Reserva has created a number of activities which contribute to improving public administration, encouraging enterprise and promoting tourism with the support of partner companies and the Instituto Votorantim (Votorantim Institute).

"In 2017, we celebrated five years since the implementation of our social effort strategy in Legado das Águas. This great relationship has allowed us to carry out a wide-ranging study

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Our aim in implementing these programs is to promote environmental conservation and to create shared value.

Simone Conte, Social Responsibility Consultant, Legado das Aguas

into the wants and needs of the local towns and raise some of their main demands, as well as developing a social agenda in partnership with the Instituto Votorantim. Through these actions, we want to take action to help the local area to find their vocations and create the conditions to improve the Human Development Index in the area," says Simone Conte, Legado das Águas' Social Responsibility Consultant.

AGP - APOIO À GESTÃO PÚBLICA (PUBLIC ADMINISTRATION SUPPORT PROGRAM)

One of the main efforts within the program was to finalize the Plano de Turismo Integrado Regional (Plan for Regional Integrated Tourism), including the townships of Juquiá, Miracatu and Tapirai, formulated with the partner company Diagonal. "The plan introduces a complete inventory of all activities related to tourism in the three towns. Among other information relevant to the sector, maps have been created and a complete study of the supply and demand for tourism in the area was undertaken. Besides this, training workshops were held for public administrators and representatives in the hospitality and restaurant industries with the aim of providing more integration within the tourism sector. "The region has enormous potential for tourism. Now, we just need to know how to tap into it," Simone Conte comments. The Plan will also be useful when the towns apply for the Town of Touristic Interest program.

EMPREENDE TAPIRAÍ (TAPIRAÍ UNDERTAKING)

This program was set up by Legado das Águas to encourage entrepreneurship in the region of Tapirai, paying particular attention to the characteristics and features of the local economy. The first training sessions involved around thirty people and were held in 2016. After that, in 2017, the best projects were selected to receive important training in managing a business, leadership and technical assistance from the Instituto Meio (Meio Institute), the partner responsible for the program. At the end of the process, the following entrepreneurs received initial assistance to set up or boost their businesses:

- Associação Cabocla do Bairro Ribeirão da Anta (local association);
- Confeitaria Pão Divino (bakery);
- Gengibre & Cia. (beauty and personal care);
- Vale Vivo, which produces organic banana flour.



Sonia dos Santos, Leader of the Gengibre & Cia. project

ReDes - REDES PARA O DESENVOLVIMENTO SUSTENTÁVEL (SUSTAINABLE DEVELOPMENT NETWORKS)

ReDes was formed in partnership with the Instituto Votorantim and is expected to last five years. It started in Juquiá and Tapirai in 2016, with a focus on helping structure businesses through the articulation of production chains and investment in projects. One of its main propositions is to strengthen the associations between its members by means of strategic

”

We found out about the program during a workshop held by the Instituto Meio. We did all the training. It was all very useful in learning how to get the business off the ground. We are a family business, and we use the projects' resources to outsource the processing of raw materials and to acquire packaging and labels. Now, we sell our product in the Organic Market at Água Branca Park in São Paulo city.

Jonatas Malta da Costa, one of those responsible for the company that produces organic banana flour



APIVALE meeting

planning workshops that map out the businesses' needs and help build goals and action plans.

Throughout 2017, the APIVALE - Associação dos Apicultores do Vale do Ribeira (Beekeepers' Association of the Vale do Ribeira) in Juquiá and the ARCPHPN - Associação Rural Comunitária de Promoção Humana e Proteção à Natureza (Rural Community Association for Human Improvement and Protection of Nature) in Tapirai, have benefitted from ReDes. "The businesses that received support via ReDes showed great improvement in their production management, which generates access to new markets and an increase in income generation," Paula Ebeling, consultant at the Instituto Votorantim, points out.

Main actions taken together with APIVALE and ARCPHPN

- Establishing, monitoring and implementing action plans;
- APIVALE's refurbishment of the Casa do Mel headquarters;
- Start of collective roadside sales with ARCPHPN;
- Group structuring for new investments;
- Start of institutional strengthening.

VALUING OF CULTURE AND INCLUSIVE EDUCATION

One of the most touching moments of 2017 for Legado das Águas was the launch of the book *Ribeirão da Anta - Resgate histórico de uma comunidade tradicional cabocla de Tapirai - SP* (*Ribeirão da Anta - the Historical Rescue of a Traditional Cabocla Community in Tapirai - SP*). This happened during a session at the Tapirai City Council, held in the presence of several community inhabitants and some descendants of the pioneers who lived in the region in the 1930s.

The book, which brings together dozens of reports, interviews and numerous photos by Maurilo Casemiro from the Resolve consulting firm, recounts, in rich detail, the saga of four families who left their original cities and journeyed deep into the forest for days on end until they established the area known today as Ribeirão da Anta, starting a true *Cabocla* community in the interior of the State of São Paulo.



PUBLISHING A BOOK
RESPONSIBLE FOR REVIVING
THE STORY OF THE RIBEIRÃO
DA ANTA COMMUNITY AND
THE ACTIVITIES SHARED IN
PARTNERSHIP WITH THE
INSTITUTO VOTORANTIM ALSO
MARKED THE YEAR OF 2017

"For us it was really important to understand how the current community representatives in Ribeirão da Anta were portrayed in the book. Many of them, until that moment, did not know their forefathers' past. Now, through the book, we were able to share with them the difficulties and challenges they underwent," explains Simone Conte, consultant for Social Responsibility at Legado das Águas. Through this important effort to give value to the history and culture of a traditional population, the Municipal Chambers of Tapirai granted Legado das Águas the Recognition Award.

“

I was incredibly happy when the book was published as it is both preserving and publicizing our history. Even in Tapirai, there are very few people who know Ribeirão da Anta's past.

Cilene Faria de Moraes, great granddaughter of Gumercindo and Marian, the first inhabitants of the community and president of the Associação Cabocla do Bairro Ribeirão da Anta (Cabocla Association of the Ribeirão da Anta)

Besides the launch of the book, here are further activities that took place in the Ribeirão da Anta community:

- Inauguration of Cozinha Cabocla e do Centro de Tradições Caboclas do Ribeirão da Anta (typical culinary and Ribeirão da Anta Center for Cabocla Traditions);
- Associação Cabocla do Bairro Ribeirão da Anta's cultural exhibition in Piedade;
- Institutional Strengthening Workshop – Mapping Work Fronts and Association Vocations;
- Workshops on Solid Waste and Snakes



Associação Cabocla do Bairro
Ribeirão da Anta's cultural exhibition

PVE, PARCERIA VOTORANTIM PELA EDUCAÇÃO (VOTORANTIM PARTNERSHIP FOR EDUCATION)

The quality of public education in Brazil still presents an enormous challenge to overcome and is one of the main factors responsible for the low levels of development in the country. Some indicators point to the fact that poor management of public investment in the sector has meant that Brazil loses R\$ 56 billion each year. In an attempt to reverse this scenario, the PVE - Parceria Votorantim pela Educação was created in 2008 to contribute to improving public education in the 57 regions and 16 states where the company has activities by socially mobilizing local communities and promoting good management practices.

The program was developed by Legado das Águas in Vale do Ribeirão and adhered to Instituto Votorantim's guidelines, offering two models. The individual PVE provides specific services specific to the region with localized, focused activities and efforts. The PVE Hubs provide services geared towards two or three regions within the territory. In this case, some of the activities and efforts are individualized while others are collaborative. "In 2017, the town of Juquiá worked as a hub together with Miracatu and Juquitiba, allowing more significant interaction and an exchange of experiences between the Secretariats for Education," said Elaine Izabel de Moura, education analyst at Legado das Águas.

Throughout the year, a number of activities were held aimed at strengthening educational management and developing projects with students within these regions. All this was achieved through training and mobilization involving the school community. The activities included:

- Training with technical staff for the local Secretaries for Education in Juquiá, Miracatu and Juquiá;
- Training with public school principals and coordinators in Juquiá;
- Developing the Criativos da Escola (School Creatives) Workshop with students from the regional and state public school system in Juquiá aimed at encouraging creativity based on interaction, experimentation and collaboration among youths;
- Defining the project's theme: A escola é para todos! (School is for Everyone!) #PorUmaEducaçãoInclusiva;
- Participating in the II Conferência Escolar para o meio ambiente (School Conference for the environment) in Juquitiba;
- Workshop on the importance of biodiversity in the Atlantic Forest in the Vila São José school, in Miracatu;
- Planting seedlings with students from APAE and the regional public schools in Juquiá. ■

In 2017, the PVE was present in

53 Brazilian municipalities
and 16 Brazilian states;

795 schools
benefitted;

More than **700,000** students were impacted.

Momentos

NATURE REVEALED

There is no better scenario for one of Brazil's most renowned nature photographers than Legado das Águas, a rare area of land with around 75% of its territory in an advanced stage of conservation. In the last six years, while walking for hours along the trails, climbing and descending hills, climbing trees of more than 10 meters or wading the many water courses that cut through Legado, Luciano Candisani has managed to capture the most surprising images that reveal the exuberance of the Atlantic Forest's biodiversity and share it with the public.

Some of his images even travelled the world and become iconic references within the region, such as the albino tapir, photographed in 2015. Nevertheless, more than just capturing a photo of

an isolated animal, Candisani sought to develop visual narratives that awaken the eyes of those who see it. For this reason, he created the Legado da Mata project. "My aim is to produce images that transmit the concept of a forest that is alive and healthy, precisely what Legado das Águas is," he explains. With this, he has been putting together a unique collection with images used for several purposes (see box).

From 2017 onward, after having photographed hundreds of species of plants and animals (many of them rare or endemic to the Atlantic Forest) and representatives of the communities which live in the region of Legado, Candisani has chosen to focus his work on accompanying researchers working in Reserva.



Copy of the front page of the newspaper Folha de São Paulo from April 17, 2017, showing biologist Mauro Rebelo in action at the top of a tree in Legado das Águas



"My idea is to create a record of people doing fieldwork, recording their activities and creating a link between the work being done by the scientists and the conservation of the forest. After all, this is the only way everyone can understand the need to protect an area as rich as this," he tells us.

The photo to the left, for example, captures exactly this. Biologist Mauro Rebelo needed to collect some DNA from a specific plant located at the top of a tree. To do so, Candisani, Rebelo and Luciano Zandoná, another partner, needed to choose a tree and, using ropes and pulleys, get to the top. After a few hours' work, Mauro finally found the tree he was looking for. It was by no accident that this photo was on the front page of the *Folha de São Paulo*, in April 2017. ■



IMAGES OF LEGADO IN THE MEDIA

The photos taken by Luciano Candisani, who took most of the images used in this publication, are also used in several different forms of communication with the public. The following are some examples from 2017.



Anambezinho

Buff-throated purple tuft



A RARE BIRD

Those who walk along the trails at Legado das Águas are able to appreciate dozens of species of bird. But few are as emblematic of the Atlantic Forest as the *anambezinho* (*Iodopleura pipra*). "It is a species that depends on well preserved environments to survive and that is generally associated with the forests and lowlands in the east of Brazil," explains Wagner Nogueira, ornithologist.

The *anambezinho* lives in the tree canopy (the higher part of the tree) and feeds mainly on fruits. Its small size (it only measures about 9 cm), discreet song and preference for the canopy, means that, apart from naturally being rare, it is really difficult to locate. It is one more endangered species. Wagner Nogueira adds, "the *anambezinho* is one of the most sought after attractions by bird watchers who visit Legado and it is always one of the most celebrated birds if ever it graces the observers with its rare appearance." ■

If 2017 has brought many advances and victories, the year 2018 promises to be even better, with a number of projects continuing, the implementation of new initiatives, and the structuring of new and important partnerships. Take a look:

- Broadening the legal reserve compensation contracts;
- Reforestation in public parks, third party APPs and other priority areas in the state of São Paulo;
- Increasing the production of seedlings and plants focusing on native ornamental species;
- Increasing activities in ecotourism and environmental studies;
- Improving visiting facilities for those wishing to take part in adventure tourism, especially mountain climbing, biking and kayaking;
- Improving visiting facilities for those interested in bird watching activities;
- Training local environmental monitors (guides);
- Inaugurating the Reservation Central;
- Intensifying rescue efforts and orchid studies;
- Seeking further partnerships to continue biotechnological research;
- Restructuring research into and monitoring of butterflies and various species of mammal, such as the tapir, the jaguar and muriqui monkey;
- Broadening studies into herpetofauna;
- Improving security in the area of Reserva and environmental monitoring. ■

legadodasaguas.com.br

contato@legadodasaguas.com.br
+55 13 99108 4057

  /legadodasaguas



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