BRAZIL

PONTAL DO PARANAPEMA

NOVEMBER 2017

WeForest
Making Earth Cooler

THE PROJECT

Poor agricultural practices and grazing are responsible for severe deforestation in many places around the world. Deforestation, in turn, leads to wild animals and plants disappearing (biodiversity loss). In Brazil, since 2014, WeForest and its partners are demonstrating that biodiversity friendly and economically viable land use alternatives are possible. Forest connectivity is promoted within the productive landscape in the Interior Atlantic Forest, a highly threatened and biologically significant ecoregion stretching from northeast Brazil to Paraguay.

IMPACT FOR PEOPLE, PLANET AND CLIMATE

The data collected is based on various audits we perform during the year:

- Forestry audits: performed according to the SMA protocol to assess the florestic composition and functionality of the ecosystem, latest in October 2017
- Socio Economic audit: socio-economic surveys to measure progress on livelihood improvement and income increase of engaged families, latest in April 2017
- Carbon audit: LiDAR measurements to assess biomass growth, latest in November 2016

LANDSCAPE TRANSFORMATION

Trees financed[1]**:** 1 026 500

Hectares directly restored: 453 ha

Total area positively impacted: 45 000 ha

All restoration areas are subjected to a field diagnosis to determine their conservation status and natural regeneration potential. This has been described as ecological memory or resilience capacity of the area being restored. Based on the findings, we determine the most appropriate tree species to be planted and restoration methodology to be used (see Page 4).

BIODIVERSITY CONSERVATION

Keeping everything in balance: This project is innovative because it develops new systems of landscape management that balance socio-economic gains with the protection of ecosystem services and conservation of threatened species.

Black lion tamarin, the most endangered species within the genus *Leontopithecus*, has habitat in the project area.

82 kg of seeds collected and 100 different species grown in community agroforestry nurseries between May and October 2017, in an effort to boost the diversity of trees and plants.

CARBON SINK

The tree planted to date will eventually after 30 years have stored **162 824 tons of CO_2** or an equivalent of **annual carbon footprint of 16 000 Europeans**.[2]

Biomass estimates of all planting activities will now be led by the Laboratory of Quantitative Methods, located at the Forestry Department in ESALQ University of São Paulo. In 2009, the Laboratory created a research branch developing a methodology that could **measure forest biomass and carbon absorption remotely using biometric parameters**. The team of graduate students is led by Professor Luiz Carlos Estravir Rodriguez. Their findings so far suggest a strong correlation between LiDAR-derived data and forest parameters obtained with ground-based measurement methods of forest inventory.

COMMUNITY ENGAGEMENT

approx. $800 000 of income generated for the local community from services and seedlings for sustainable livelihood alternatives since 2015

465 participating families benefited since 2015

8 community-based agroforestry nurseries operating for the project (about 70% of production) and also serving the local market and seedling to local farmers and large private owners restoring their legal reserves and gallery forests

53 families received training in seedlings production

400 farmers were trained in agroforestry and organic farming

DIFFERENT APPROACHES FOR DIFFERENT CHALLENGES

SUCCESSION-BASED MODEL

For areas showing high resilience (i.e. capacity of an ecosystem to respond to a perturbation or disturbance by resisting damage and recovering quickly) a succession-based model is developed which consists of mainly 'filling' planting lines and 10–12 fast-growing species that are planted to promote fast soil coverage, and improve environmental conditions near the ground.

As the main goal is the rapid suppression of exotic weeds and to promote soil coverage the following species are normally included in the restoration filling lines (*Gochnatia polymorpha*, *Guarea guidonea*, *Tapirira guianensis*, *Inga striata*, *Inga laurina*, *Inga uruguensis*, *Pera glabrata*, *Croton floribundus*).

Where necessary to fill restoration gaps, these fast-growing species are intercropped with green manure fertilization pigeonpea (*Cajanus cajan*). The cultivation and fertilization of green manures are options to minimize compaction of the topsoil, provide rapid soil coverage and compete with exotic weeds.

ACTIVE RESTORATION

After soil preparation we plant 2 000 seedlings per ha (spacing 2.0 x 2.5 m) using at least 100 native species divided into filling lines (approx 10 species) and diversity lines (at least 90 species). The area is completely Isolated with fences, firebreaks and controlled for leaf cutting ants. Soil coverage should be attained (i.e. values of coverage > 100%) after 2 and 3 years of planting the filling and diversity lines, respectively, almost 2 years faster than other planting models. The proximity of forest fragments (distances < 500 m) will also greatly affect the speed and trajectory of forest recovery, as well as the reestablishment of critical ecological interactions (e.g. dispersal, pollination and herbivory). Corridor gaps are also undergoing similar operations to fill open areas between resorted polygons.

Active restoration in Area 2 of Rosanella Farm.

PASSIVE RESTORATION

Rehabilitation of woody regrowth dominated by native or exotic trees and shrubs. Stimulating natural regeneration is dependent on the presence of established trees that promote seed supply,reduce competition with other vegetation, and provide microsites for germination and establishment of native trees. Passive restoration typically requires 'social fencing', the exclusion of any human activities such as livestock management that could interfere with regeneration processes.

Passive restoration in Area 2 of Rosanella Farm.

Seeds and/or resprouts are essential ingredients of forest regeneration in this area. Seeds disperse from sources within or close to the site and sources of regenerating plant species are present as seeds in the soil seed bank, root stocks or stolons present below the soil surface, or as seeds dispersed from local or surrounding plants. These sources, which are based on biological legacies present in the local or surrounding areas can be collectively termed ecological memory.

MIXED RESTORATION

Combining active and passive restoration methodologies. Where natural regeneration potential is limited in places, active planting may be necessary to fill gaps or improve quality aspects.

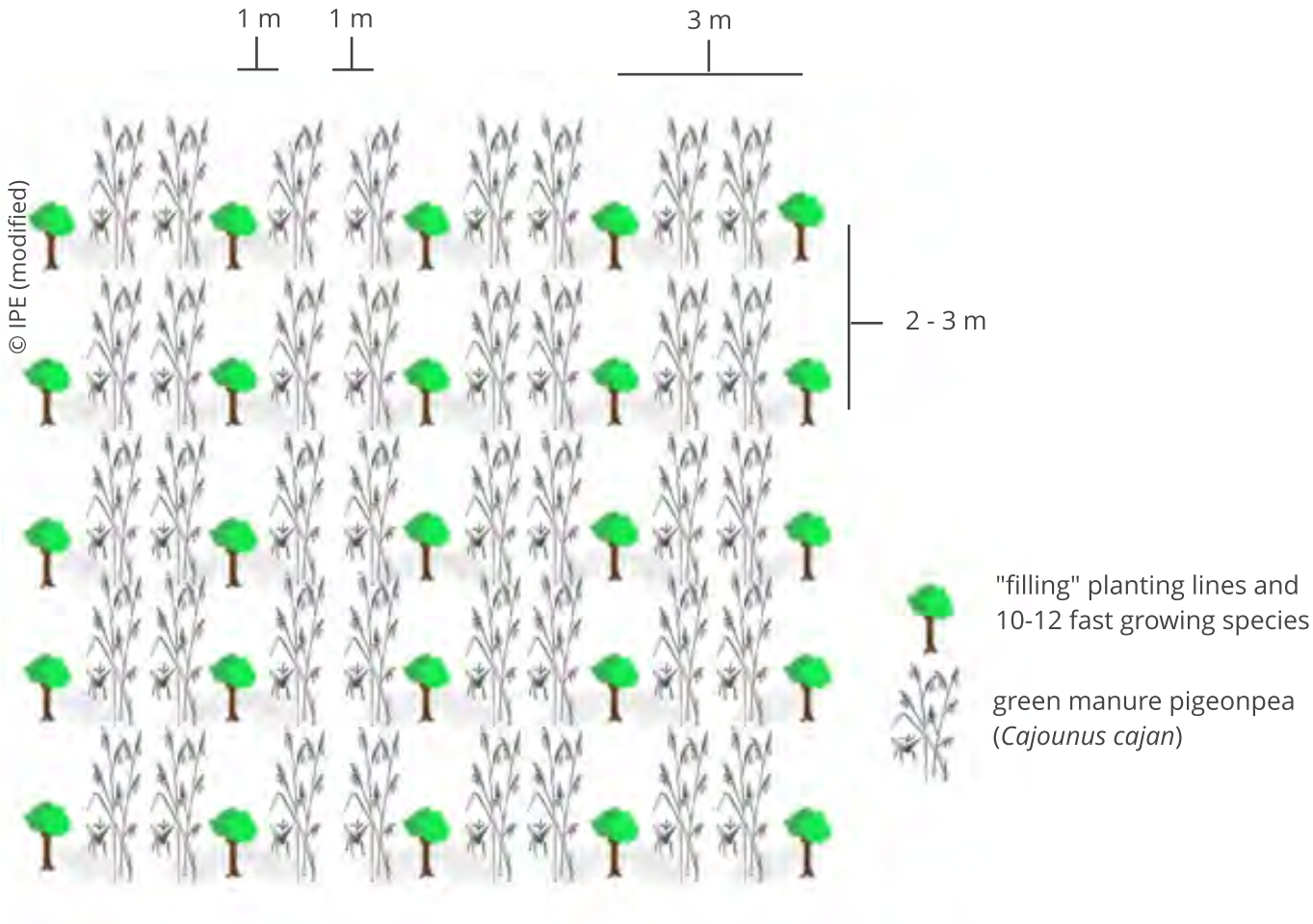
ACTIVITIES AND RESULTS

ARCO IRIS FARM (ACTIVE RESTORATION)

Since March 2014, in collaboration with the local community, the project team has finished the planting of 40.600 trees in 20 ha of rural settlement land. Activities aimed on restoring Legal Reserves (RLs) gallery forests (APPs) of the “Arco Iris” settlement (22.29.134 S / 52.34.115 W), promoting the connectivity of important Atlantic Forest fragments in the surrounding rural landscape. Currently, the activities are involving controlling leaf cutting ants and working with the local community about the importance of avoiding fire and other threats to the restored forest such as cattle and exotic weeds.

SANTO ANTÓNIO FARM (MIXED RESTORATION)

Since June 2014 we have been working in the restoration on approximately 74 ha in the Santo António Farm. In total, approximately 161.000 seedlings were planted in the area. For this area, showing high resilience (i.e. capacity of an ecosystem to respond to a perturbation or disturbance by resisting damage and recovering quickly) we developed a succession-based model which consists of mainly ‘filling’ planting lines and 10–12 fast-growing species that are planted to promote fast soil coverage, and improve environmental conditions near the ground. As the main goal is the rapid suppression of exotic weeds and to promote soil coverage the following species are normally included in the restoration filling lines (*Gochnatia polymorpha*, *Guarea guidonea, Tapirira guianensis*, *Inga striata*, *Inga laurina*, *Inga uruguensis*, *Pera glabrata*, *Croton floribundus*). Where necessary to fill restoration gaps, these fast-growing species are intercropped with green manure fertilization pigeonpea (*Cajanus cajan*). The cultivation and fertilization of green manures are options to minimize compaction of the topsoil, provide rapid soil coverage and compete with exotic weeds.



Sucession-based model developed by "filling" planting lines and green manure.

ROSANELA FARM

The Rosanela Farm is an important area of the main forest corridor consolidating habitat connectivity between the Morro do Diabo State Park and the Black Lion Tamarin Ecological Station. Since May 2016 we have planted and assisted the natural regeneration of approximately 34 ha and in December 2016, all plantings were finished. In total, 34 hectares were planted, with 45.000 seedlings based on the mixed restoration methodology, where succession-based with mainly 'filling' planting lines and 10–12 fast-growing species are planted to promote fast soil coverage, and improve environmental conditions near the
ground and further promote the colonization of another tree species. Where necessary to fill restoration gaps, these fast-growing species were intercropped with green manure fertilization pigeonpea (*Cajanus cajan*) as a mean of catalyzing and speeding the restoration process. Permanent diagnostics will dictate the need of additional enrichment planting with more diversity species.

- **Area 1 (Mixed restoration)**

  Helps to consolidate the habitat connectivity between the Morro do Diabo State Park and the Black Lion Tamarin Ecological Station.

Area 1 in May 2016.

Area 1 in November 2017.

- **Areas 2 - 5 (Active restoration)**

  In February 2017 our team finished all active plantings in these areas. After soil preparation, we followed the active restoration approach, planting 2 000 seedlings per ha (spacing 2.0 x 2.5 m) using at least 100 native species divided into filling lines (approx. 10 species) and diversity lines (at least 90 species). The area is now completely Isolated with fences, firebreaks and controlled for leaf cutting ants. Maintenance activities are now underway preventing the area from invasive and exotic grasses. Soil coverage should be attained (i.e. values of coverage >100%) after 2 and 3 years of planting the filling and diversity lines, respectively, almost 2 years faster than other planting models. The proximity of forest fragments (distances < 500 m) will also greatly affect the speed and trajectory of forest recovery, as well as the reestablishment of critical ecological interactions (e.g. dispersal, pollination and herbivory). Corridor gaps are also undergoing similar operations to fill open areas between resorted polygons.

Young trees in Area 3.

Area 3 in February 2016.

Area 3 in November 2017.

- **Area 6 (Passive restoration)**

  This area is undergoing a passive restoration approach with the rehabilitation of woody regrowth dominated by native or exotic trees and shrubs (Figure 05). Stimulating natural regeneration in this area is dependent on the presence of established trees that are already promoting seed supply and avoiding competition with grasses or other herbaceous vegetation and providing availability of microsites for germination and establishment of native trees. Seeds and/or resprouts are essential ingredients of forest regeneration in this area. Seeds disperse from sources within or close to the site and sources of regenerating plant species are present as seeds in the soil seed bank, root stocks or stolons present below the soil surface, or as seeds dispersed from local or surrounding plants. These sources, which are based on biological legacies present in the local or surrounding areas can be collectively termed ecological memory.

Area 6 in April 2007.

Area 6 in November 2017

SANTA ZÉLIA SETTLEMENT (MIXED RESTORATION)

In March 2017 our IPÊ partner selected this site to be considered for the above TPO and for a mixed restoration methodology. This area is part of the Legal Reserve of the rural settlement. After field diagnostics, the team considered the area with a very good potential for intermediate natural regeneration. This selected 50 ha polygon is characterized by an abandoned pasture with small "patches" of regenerating seedlings and forests with isolated native trees. In May 2017, the contacted rural community started activities such as encouragement of regenerating individuals of native trees and shrubs by manual or chemical control of invasive grasses and active restoration of patches with filling species.

FUTURE PLANS

This map prepared by our partner IPÊ shows (in light green) the priority areas for forest restoration in Pontal and, at the same time, represents the "environmental passive" of all the Atlantic Forest in Pontal do Paranapanema, approximately 50.000 ha still need to be restored to connect all remaining forest fragments and protected areas. There are areas legally required to be forest and that are currently not compliant, such as riparian buffers and legal reserves. WeForest and IPÊ are working to connect all forest fragments to the remaining protected areas in the region (dark green) (Figure 09).

Our next big step for the next 5 coming years is to restore the "North Corridor" (red rectangle in the above map) an extremely important area that will provide connectivity between the North portion of the Morro do Diabo State Park and the Black Lion Tamarin Ecological Station. This joint effort will demand 500 ha and 1.000.000 trees of restoration efforts (Figura 10). This area will need a combination of all restoration approaches such as Active, Mixed and Passive restoration.

Projections of how much additional reforestation is needed to maintain connectivity in the area once the project is completed. Dark green are remaining forests and light green areas that need restoration.

FOOTNOTES

1 Includes 64 290 trees financed in 2014, 207 000 trees financed in 2015, 532 212 trees financed in 2016 and 220 000 trees financed in 2017 (still ongoing).

2 Assuming the average annual carbon footprint of one European is an equivalent of 10 tons of CO_2.

PROJECT CHRONOLOGY

2013	IPÊ submitted a project proposal to WeForest
2014	Due dilligence and approval of partnership, first trees planted
2016	Research partnership signed with São Paulo University (LASTROP and EASE), the Federal University of San Carlos (LASPEF), Robin Chazdon from PARTNERS and IPÊ WeForest launched a research programme examining the impacts of FLR implementation, FLR success indicators and providing a basis for the development of an international FLR standard with a team of graduate students. All research findings inform project implementation and are part of WeForest's adaptive management approach.
2017	WeForest organised the International Forest Landscape Restoration Dialogue that led to the emergence of the Forest Landscape Restoration (FLoRES) Task Force. FLoRES Task Force led by WeForest published a "Call for action" brief

BENEFICIARY STORY: CISERO, MEMBER OF THE LANDLESS WORKERS MOVEMENT

Cisero is an "asentado" or settler and member of the Landless Workers Movement advocating for a land reform in Brazil that would secure access to land for rural workers. Cisero and a group of others received a plot of land from the government that they manage and earn a living from through farming. They have been active in forest restoration work for an impressive 12 years and were contracted to carry out assisted natural regeneration and enrichment planting for our project.

Through contracts with our project, Cisero's team can earn substantial additional income. But to Cisero, the restoration work is also important on a personal level because he sees that deforestation threatens the quality of soil and water systems in Pontal. In an area where people's livelihoods rely heavily on the land, protecting and restoring the forested landscape is vital.

WeForest is an international non-profit that specializes in mobilizing companies to restore the World's forests and embark their stakeholders into a long-term journey towards environmental sustainability.

In order to achieve the objectives of the Paris Climate Agreement, we must peak our global emissions by 2020 and achieve carbon neutrality by the second half of this century. While reducing carbon emissions is critical, research suggests that even if carbon dioxide emissions came to a sudden halt, the carbon dioxide already in the Earth's atmosphere could continue to warm our planet for hundreds of years. The challenge is to reduce future carbon emissions and actively remove the excess carbon from our atmosphere.

Forests are known as the best technology for that: they are an amazing carbon sink.

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THANK YOU