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THE AMAZON PARADOX

AMAZÔNIA 2030

THE DISASTROUS OCCUPATION OF THE BRAZILIAN AMAZON CURRENTLY OFFERS US THE KEYS TO BUILDING ITS SUSTAINABLE FUTURE

The recent history of the Brazilian Amazon is marked by rapid population growth and an explosive increase in deforestation. In the last 50 years, deforestation has gone from a mere 0.5% in 1975 to 21% in 2021. Put together, the accumulated destruction of around 86 million hectares of forests is equivalent to the sum of the areas of Spain and Italy. In addition, extensive areas of remaining forests are degraded by fires and illegal logging. Finally, the local population quadrupled in the same period, from about 7 million in 1970 to approximately 28 million people in 2021.

This process was accompanied by serious social conflicts and resulted in the worst of all possible scenarios: environmental destruction, low quality of life for the population, an economy with limited growth, and very high carbon emissions. In fact, in 2019, the Brazilian Amazon contributed less than 9% of the country's GDP and generated 48% of Brazil's Greenhouse Gas emissions. The majority of these were due to deforestation and fires.

The Amazon region is suffering from record deforestation rates, violence, and worsening social conditions. However, each of the factors that contribute to the current crisis presents elements that can serve as a foundation for sustainability in the region. This context constitutes the Amazon paradox, namely that it is possible that a new model of regional development, one based on the sustainable use of the forest's natural resources, may emerge from an apparently unsolvable situation.

TRANSFORMING PROBLEMS INTO OPPORTUNITIES

The Amazon paradox is made up of three elements. The first of these, the most evident, is excessive **deforestation** over the last four decades. The vast expanses of deforested lands that resulted are now degraded and underused. These lands are available for development and are much larger than the area needed for all agricultural production in the region. Thus, the deforestation crisis provides an opportunity to take advantage of these degraded lands. Increasing their agricultural productivity would avoid opening new areas for this purpose. In this scenario, there would still be extensive areas for forest restoration (planting of native forests,) reforestation, and consequent opportunities in the carbon market.

The second element of the Amazon paradox is the **forest remnant area**, which contributes to climate balance. It contains the largest reserve of forest carbon in the world, estimated at 550 to 734 gigatons* of CO_2 equivalent, and is home to the greatest terrestrial biodiversity on the planet. Despite these irreplaceable qualities, the forest's destruction continues at an accelerated pace. Ending deforestation will create an opportunity for Brazil to become an environmental power, a green nation, and consequently a preferred destination in the world's immense carbon market. Finally, the third element of the paradox – not so widely known as the first two – is the demographic profile of the Amazon, which is markedly different from the rest of Brazil. The region will experience **a demographic bonus** by mid-2030, meaning that it will have a higher proportion of economically active people (those between the ages of 18 and 64) compared to children and the elderly. However, in the current absence of employment opportunities, this bonus has become a burden. In fact, 40% of the population aged between 25 and 29 in the region has no part in the labor market.

As employment prospects for young people remain dim, violence has increased steadily in the region since the early 2000s. In 2019, the homicide rate was already 70% higher than in the rest of Brazil. This unusual level of violence contributes to the deteriorating economic environment. Lacking new opportunities, residents of the Amazon find themselves trapped in a cycle of poverty, violence, and low economic growth. In contrast, young people in the Amazon could become the driving force to develop and sustainably leverage the region's resources if they were provided with quality education, internet access, technologies, and job opportunities. Combined, these three factors – **the underused deforested areas, the carbon stock available in the forest remnants, and the workforce of the young population** – represent a great opportunity for the region's development. (Figure 1)

*** Refers to the Amazon Basin, which covers 9 countries and is estimated at 7 million square kilometers**

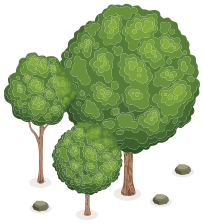
FIGURE 1 • THE AMAZON PARADOX
The Brazilian Amazon's most difficult problems are also its greatest opportunities

1

DEFORESTATION

PROBLEM
In Brazil and the Brazilian Amazon, deforestation has been extensive and unregulated

OPPORTUNITY
It is possible to increase livestock and agricultural production within the areas already deforested



2

EMISSIONS

PROBLEM
The Amazon is the biggest source of greenhouse gases in Brazil and could destabilize the Earth's climate

OPPORTUNITY
Forest conservation is one of the cheapest and most efficient ways to offset carbon emissions

3

UNEMPLOYMENT

PROBLEM
There are 8 million unemployed people in the Amazon, including many young people

OPPORTUNITY
These people can generate income and wealth if provided with job opportunities and professional training

The priority is, therefore, to **quickly end harmful and unnecessary deforestation**, as it represents the major obstacle to all three opportunities for development. In fact, forest destruction is associated with illegal activities such as wildcat gold mining, predatory logging, and forcible private appropriation of public forests, known as land grabbing. This degree of illegality deteriorates the business environment and inhibits investments in the Amazon.

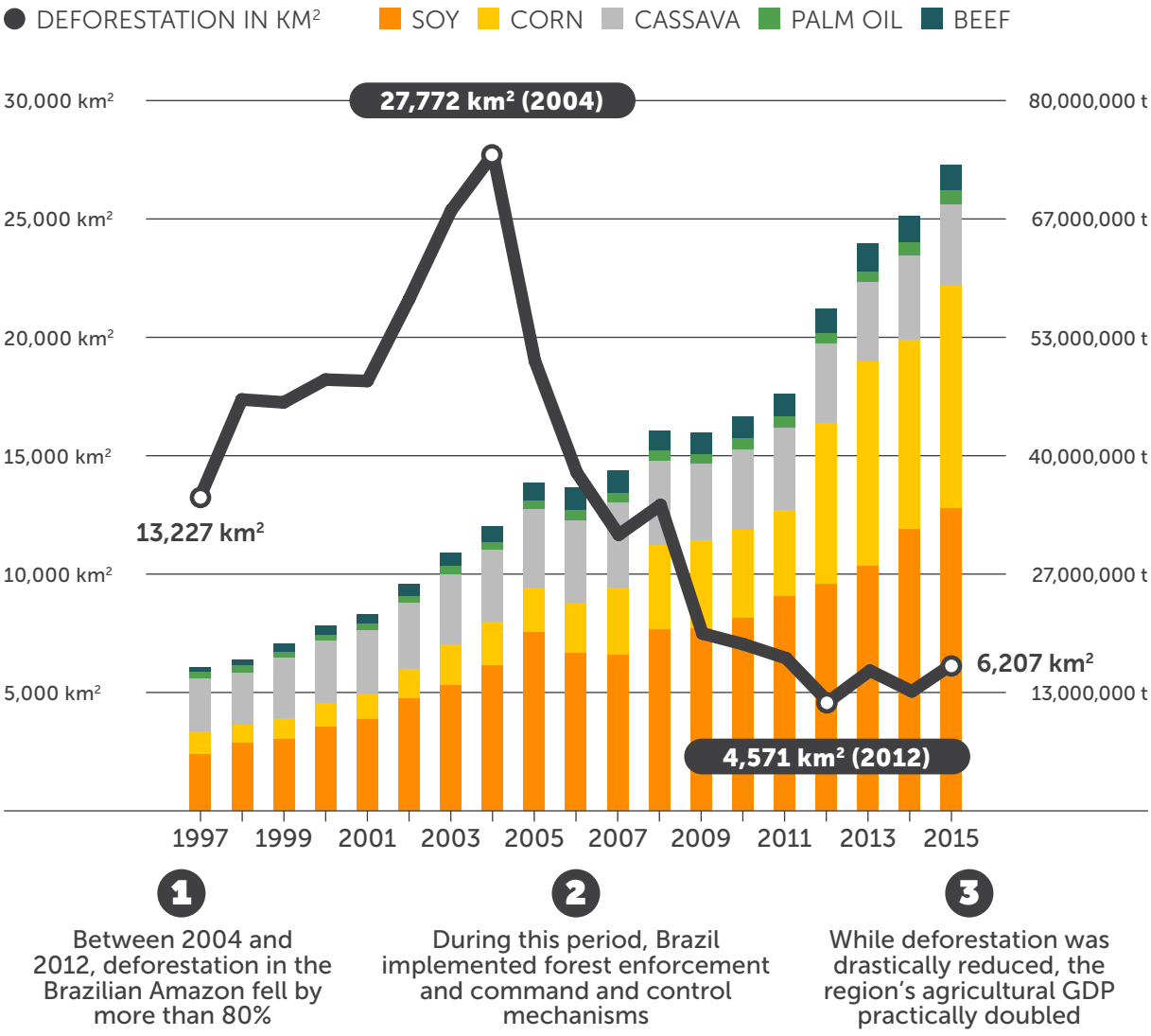
Between 2004 and 2012, Brazil managed to reduce 84% of deforestation in the Amazon rainforest

Deforestation and forest degradation (partial loss of vegetation) put the future of the forest remnants at risk. Scientists warn that fractions of the Amazon are already at risk and on the verge of losing their ability to regenerate. They are at a tipping point for irreversible degradation. These areas would then be occupied by species of smaller size, more resistant to fire and more well-adapted to the dry climate typical of the Cerrado biome. The consequences for the global and regional climate and for biodiversity would be catastrophic. Therefore, it is essential to drastically reduce deforestation in the short term and aim to bring it to zero before 2030.

The good news is that **Brazil already knows how to effectively control deforestation**. For example, enforcement measures such as the rapid detection of deforested areas with satellite images ensured a drop of around 80% in deforestation between 2004 and 2012. Furthermore, the establishment of environmental reserves, or Conservation Units, protected more than 55 million hectares of forests in the Amazon (equivalent to the territory of Kenya). This regulation was accompanied by an expansion of the agricultural GDP and, at the same time, an increase in production value in the region. (Figure 2)

FIGURE 2 • CONSERVATION AND PRODUCTION

Brazil has already managed to reduce deforestation (in km²) while increasing agricultural production in the Amazon (in metric tons)



Source: AMZ2030 with data from CPI/PUC-Rio, Prodes - Inpe and IBGE

FIVE KEY REASONS TO END DEFORESTATION IN THE AMAZON

Deforestation is bad business for Brazil. It is unnecessary and harmful to its society and economy. These are the main reasons to end deforestation in the Amazon:

1 **Deforestation is inefficient and unnecessary.** The total deforested area is more than sufficient for all agricultural and livestock production. Most deforested land is underutilized or degraded.

2 **The standing forest has a growing value** due to its significant carbon stock, the provision of environmental services, and biodiversity.

3 **Deforestation constitutes losses for Brazilian society.** Much of the current deforestation occurs in public forests, which causes a huge loss of public property.

4 **Deforestation goes hand-in-hand with illegal activities** and contributes to social conflicts and endemic violence in the region, deteriorating the economic environment and inhibiting investment.

5 **The destruction of the Amazon affects Brazil's international reputation, reducing investments and harming trade agreements, such as the European Union's treaty with Mercosur.** Furthermore, the destruction of the Amazon is an existential threat to the planet's climate stability and affects Brazil itself, which depends on the waters of the Amazon for its agricultural production and hydroelectric power generation.

FIVE ECONOMIC OPPORTUNITIES FOR THE AMAZON

Despite the negative effects of deforestation in the Amazon, there are new opportunities for economic activities that can transform the region's challenges into solutions for sustainable development. There are at least five possible paths:

1 CONSERVATION

2 FOREST RESTORATION

3 FOREST PRODUCTS

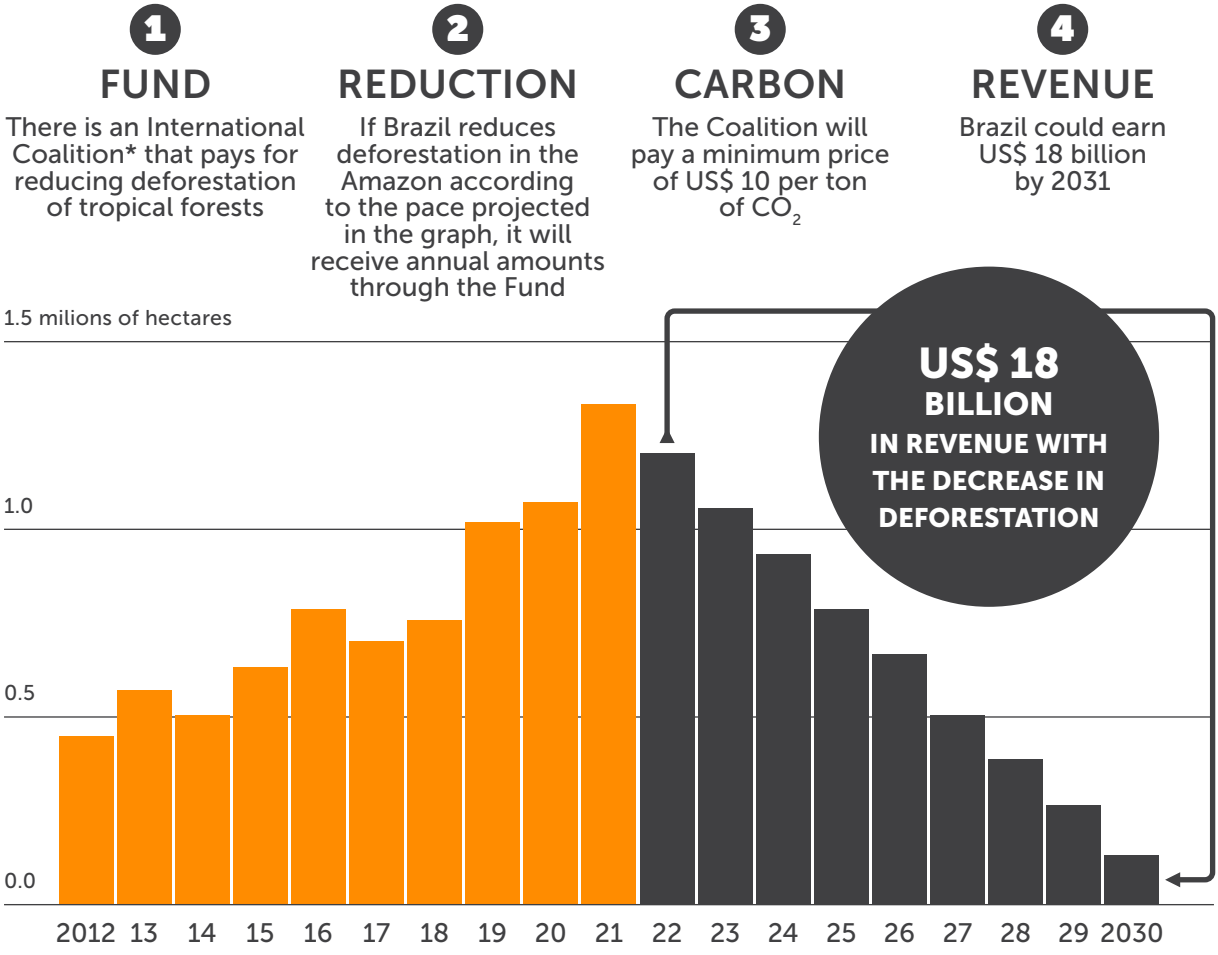
4 LIVESTOCK AND AGRICULTURAL PRODUCTION

5 CITIES

1 CONSERVATION

The first path is to take advantage of the opportunities presented by the carbon markets to keep the forest standing. Among its multiple local, regional, national and global benefits, a reduction in deforestation can attract new investment flows to the Amazon. One example is the ***LEAF Coalition***, which offers payment for reducing emissions from deforestation and forest degradation (REDD+) at national and subnational levels. According to LEAF, ending deforestation in the Brazilian Amazon by the end of this decade could generate up to US$ 18.2 billion (through carbon markets at a minimum price of US$ 10 per ton of CO_2). If prices rise to US$ 15 per ton of CO_2, revenue could reach US$ 26 billion. (Figure 3)

FIGURE 3 • PROTECTING THE FOREST GENERATES PROFIT
How to make money from reducing deforestation (in millions of hectares)



* Leaf Coalition – (Lowering Emissions by Accelerating Forest Finance)

Source: AMZ2030 based on data from INPE (2022)

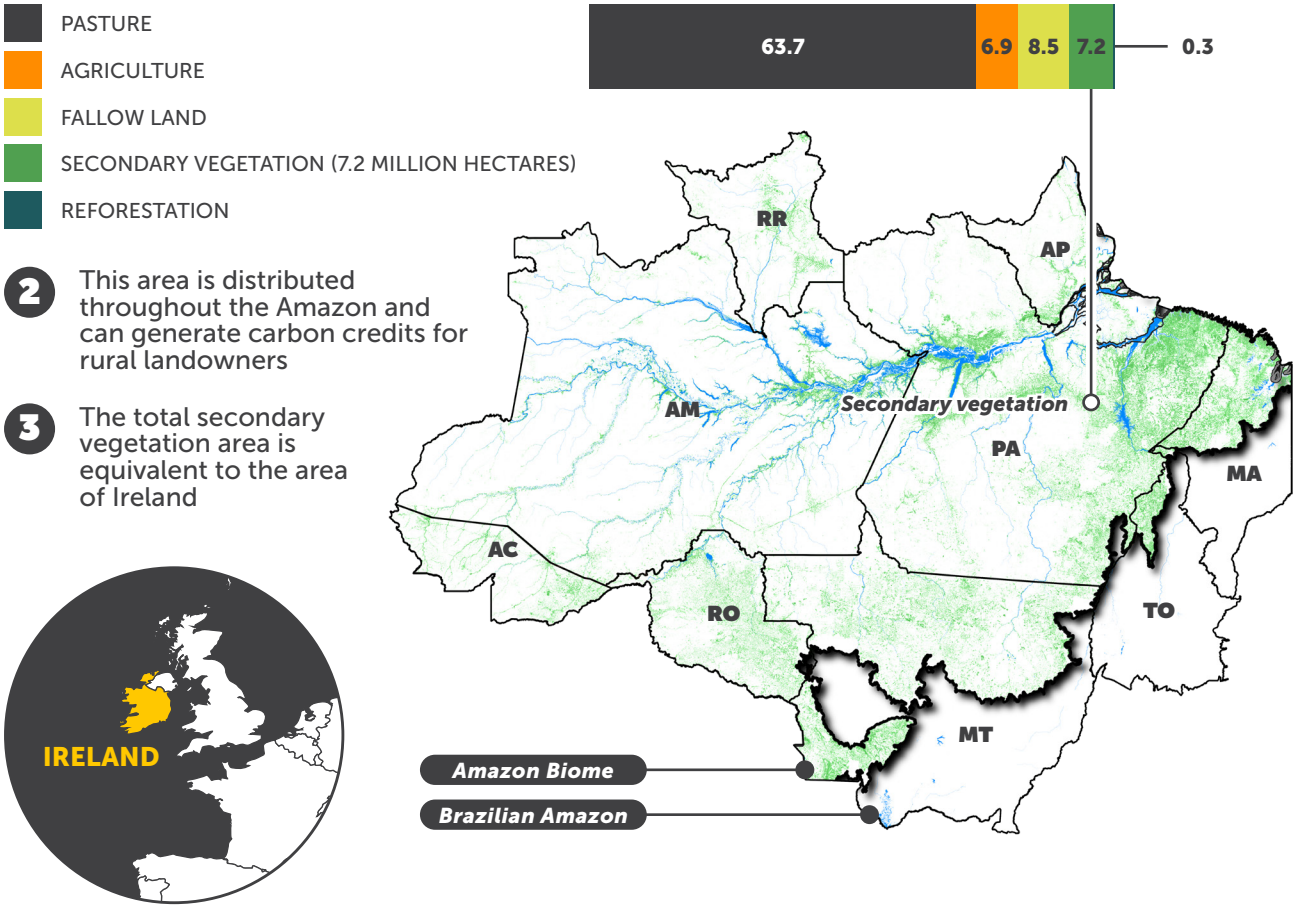
2 FOREST RESTORATION

The second path is to invest in restoration with native species to rebuild the original forest. This approach is different from so-called reforestation, which consists of planting exotic species, such as eucalyptus. There are two ways to carry out restoration: first, actively planting seedlings of trees of native species in deforested areas. Second, taking advantage of natural regeneration in abandoned deforested areas that are in a slow process of regeneration. Around 15 million hectares of the region are currently deforested and without active agricultural use. These areas, which are equivalent to the territory of Nepal,) represent the main candidates for forest restoration. **A recent study by the Amazon 2030 project revealed that, of this total, 7.2 million hectares have been naturally regenerating for over six years**. This process of ecological succession is returning these areas to forestland. (Figure 4)

FIGURE 4 • A FOREST THAT REGENERATES ITSELF

Opportunities with secondary vegetation (in millions of hectares)

1 Out of the entire deforested area, about 7.2 million hectares have crossed the threshold of 6 years or more under regeneration



Relatively modest investments could guarantee forest restoration and permit payment for carbon sequestration. On the demand side, there is also a lucrative and growing market for carbon capture through forest restoration.

According to ***Time*** magazine, the commitments to zero net emissions assumed by the 7,000 largest companies on the planet will require the worldwide restoration of almost 350 million hectares of forest by 2050.

By prioritizing forest restoration, the Amazon – with its extensive deforested, abandoned, or underutilized areas – can seize this opportunity in the carbon capture market. Brazil has assumed the goal of restoring 4.8 million hectares by 2030 in the Amazon biome.

However, what was initially an obligation has become an opportunity thanks to the boom in the carbon capture market for forest restoration.This boom means that future efforts can go far beyond the goals announced by the Government of Brazil in 2012.

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3 FOREST PRODUCTS

The third path is to increase exports of forest-compatible products (açai, tropical fruits, fish, Brazil nuts, etc.) and agroforestry products, such as cacao and black pepper.

The Brazilian Amazon contributes only 0.2% of the global market for tropical products

These products are practically exclusive to tropical zones. The Brazilian Amazon – which represents one third of the world's tropical forests – ought to have a significant share of this market.

However, currently, the participation of the Brazilian Amazon is negligible (0.2%, or US$ 300 million/year) in a huge global market. This market is worth more than US$ 177 billion a year and is in rapid expansion. (Figure 5)

FIGURE 5 • FOREST PRODUCTS

Brazil should earn more money from exporting forest products

1 PRODUCTS
The Amazon exports 64 forest-compatible products

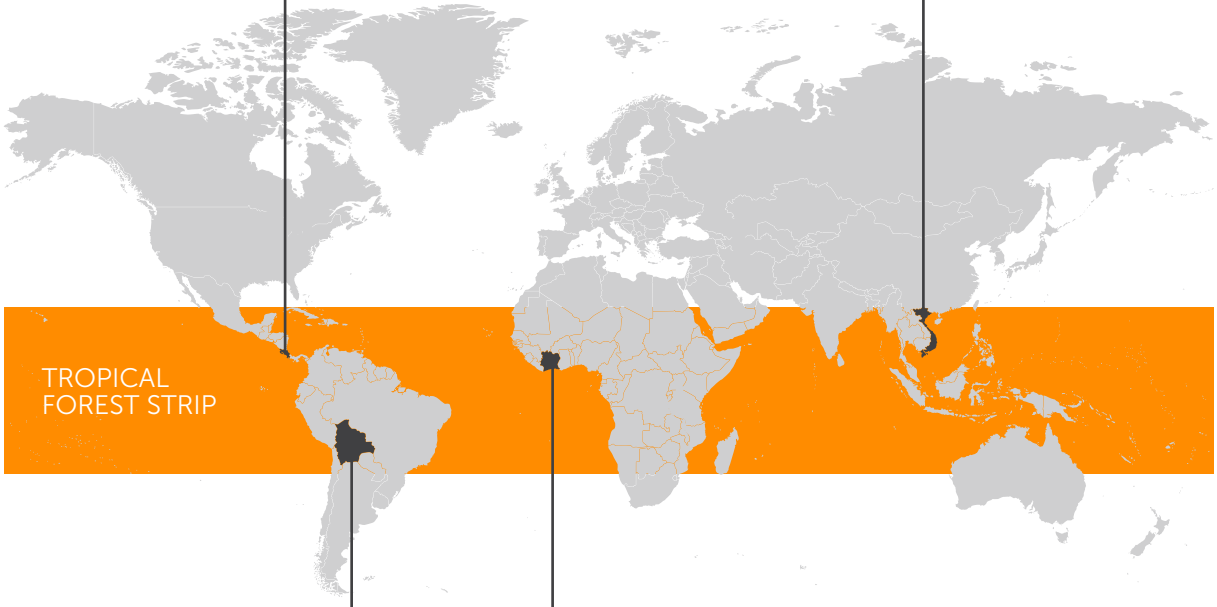
2 MARKETPLACE
The global market for these products is worth more than US$ 177 billion

3 SHARE
The Brazilian share in this market is only 0.2%...

4 FOREST
...even though Brazil has a third of the world's tropical forests

5 COMPETITORS

Many of Brazil's market competitors are less developed countries



PINEAPPLE
COSTA RICA (50%)
AMAZON (0.01%)
BRAZIL (0.06%)

BLACK PEPPER
VIETNAM (42%)
AMAZON (7%)
BRAZIL (15%)

BRAZIL NUT
BOLIVIA (52%)
AMAZON (4%)
BRAZIL (6%)

CACAO
IVORY COAST (40%)
AMAZON (0.02%)
BRAZIL (0.03%)

4 LIVESTOCK AND AGRICULTURAL PRODUCTION

There are still opportunities to make better use of previously deforested areas. **This immense area of 84 to 86 million hectares that has already been deforested* can supply the entire demand projected by the Brazilian government for agricultural production until 2030.** And there would still be areas left for other uses, especially for the promising forest restoration market (planting native trees in deforested areas to recover the original forest). Brazil must focus efforts to make better use of these areas by increasing productivity through the adoption of the best agricultural practices. (Box 1) (Figure 6)

Of the total 86 million deforested hectares, livestock occupy 63 million hectares (73%) of the total. The second largest portion of the deforested areas (15 million hectares total) is occupied by secondary vegetation that grows after these areas are abandoned.

Agriculture** and reforestation (commercial planting of exotic species such as eucalyptus) occupy smaller areas, 7 million hectares and 300 thousand respectively. We must decide now what to do with the immense deforested area that is currently occupied by low-productivity pastures. Without an increase in livestock productivity, the additional demand for meat and agricultural products could increase deforestation by around 13 million hectares, which would further exacerbate climate and socioeconomic risks for Brazil.

The area that has already been deforested in the Amazon can support the entire agricultural expansion expected and much more

That being said, it is feasible to increase livestock productivity to meet the projected demands for agricultural products by 2030. There would still remain 37 million hectares that have already been deforested. (Box 1)

This surplus area could be used to increase the production of forest-compatible products (e.g., cacao in agroforestry systems) and for forest restoration, thus supplying credits to the growing market for carbon credits (which provides compensation for planting carbon-absorbing trees).

*** According to Inpe/Prodes, this area adds up to approximately 84 million hectares, while MapBiomas calculates it at 86 million hectares**
**** Refers only to areas used for agriculture that resulted from the conversion of forest to deforested areas. Agricultural areas that were converted from the original Cerrado (savannah) vegetation are not included.**

BOX 1 • HOW CAN BRAZIL INCREASE AGRICULTURAL PRODUCTION IN THE AMAZON WITHOUT DEFORESTATION

BRAZIL IS FACED WITH A FORK ON THE ROAD

This decision will determine the future of the Amazon. The first, unsustainable path would allow the expansion of low-productivity livestock areas to meet the growing demand for meat projected for 2030. The second, sustainable path is to invest in improving livestock productivity in the Amazon, using well-known and successfully tested techniques. This approach would not only eliminate the need for further deforestation but would also allow us to supply for the entire demand for meat by 2030, using a much smaller area of pasture than we use today and leaving deforested areas free for other economic uses. To project the magnitude of land use changes in these scenarios, we considered how the region would respond to growth in demand projected for 2030. According to the Brazilian government, leading up to the 2030 harvest, the demand for agricultural production will increase by 27% and demand for beef will increase by 17% in the country. Our assumption is that production in the Amazon will grow following the same national projection, based on the 2020 baseline.

SCENARIO OF INCREASE IN PRODUCTION WITHOUT GAIN IN LIVESTOCK PRODUCTIVITY

If the region fails to implement new techniques for increasing livestock productivity, then the demand for expanding production will cause almost 13 million hectares to be deforested by 2030. An average of 1.6 million hectares would be deforested each year (a level similar to recent years). The demand for beef expansion (17% increase) in particular would require the deforestation of 10.8 million hectares. The current tendency is for agriculture (especially grains) to replace pasturing in lands with better infrastructure. Pasturing then moves to more distant borders. Thus, without productivity gains, cattle ranchers would clear another 1.8 million hectares to compensate for the pasturing land that becomes occupied by crops.

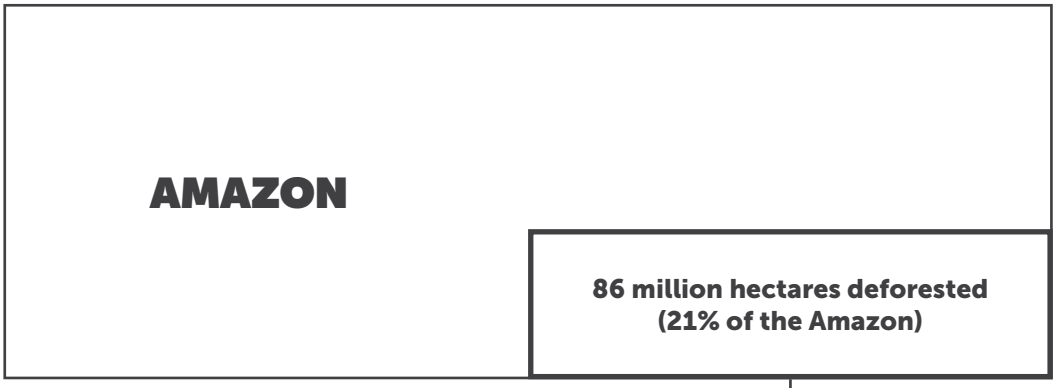
SCENARIO OF LIVESTOCK PRODUCTIVITY GAIN

If farmers adopted the efficient techniques of pasture management and animal welfare already available in the region today, it would be possible to triple the average productivity of livestock production. This increase would allow the pasture area in 2020 (63.7 million hectares) to be reduced to approximately 25 million hectares, while still maintaining current production. In total, these techniques would free up approximately 37 million deforested hectares.

FIGURE 6 • WHAT FITS IN THE DEFORESTED AREA

How can we make better use of what has already been cleared in the Amazon (in millions of hectares)

1 Nearly 21% of the Amazon has already been deforested, equivalent to 86 million hectares*

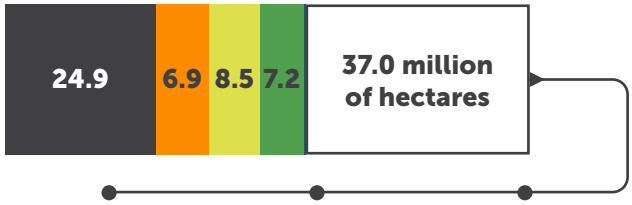


2 Currently, this cleared area is being used for the following activities:

- PASTURE
- AGRICULTURE
- FALLOW LAND
- SECONDARY VEGETATION (OVER 6 YEARS OLD)
- REFORESTATION

3 If demand for meat keeps growing at its current pace and cattle-ranching productivity does not increase, deforestation will increase by 2030

4 With an increase in livestock productivity, it will be possible to meet this demand with less pasture area, freeing up a total of 37 million hectares



5 This area is so big it would fit the entire worldwide production of...

COFFEE	CACAO	LATEX
11.0	12.3	12.8

* According to Inpe/Prodes, this area adds up to approximately 84 million hectares, while MapBiomas calculates it at 86 million hectares

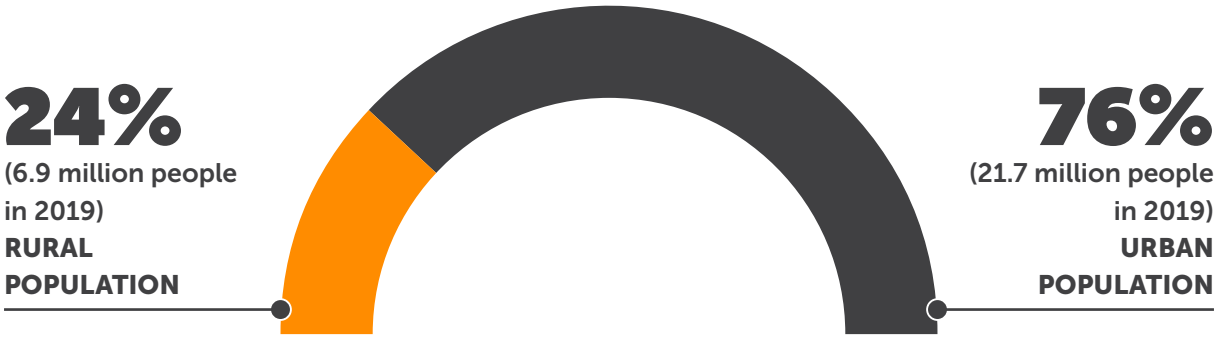
5 CITIES

Finally, the main request of people living in the Amazon is for employment. Amazonians are leaving the region to seek employment opportunities. Therefore, new investments must accelerate the growth of job openings within the region.

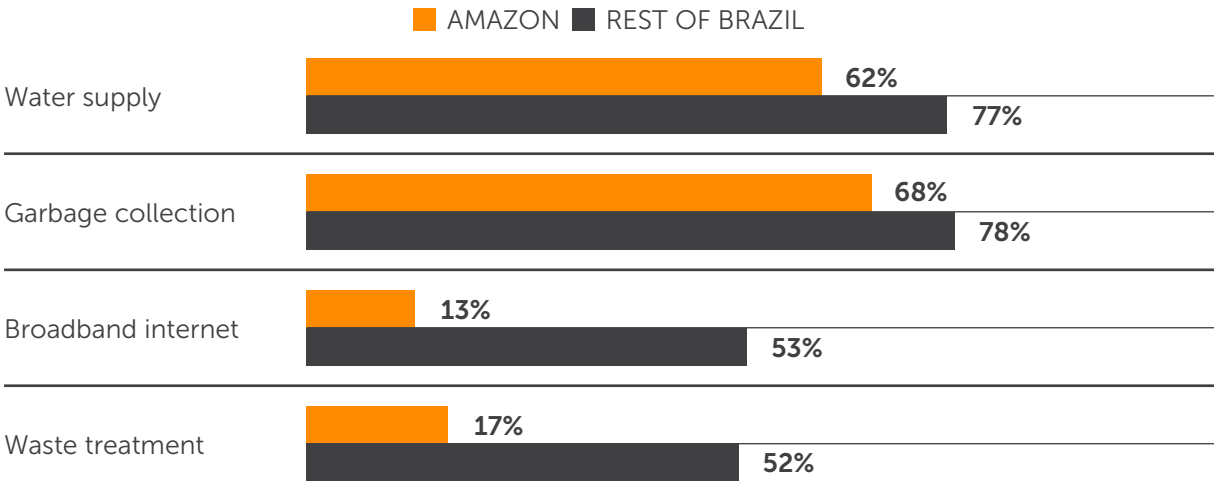
Research indicates that, rather than agricultural activity, the sectors that generate the highest quality jobs and offer improved standards of living are in cities. Therefore, urban infrastructure and vocational education should be priorities for public funding. (Figure 7)

FIGURE 7 • URBAN AMAZON

Most of the region's population lives in cities...



...and suffers from worse services than the rest of Brazil



Source: AMZ2030 with data from CadÚnico (2022), Anatel (2022) and PNAD-C IBGE (2021)

The Brazilian Amazon is more economically isolated than the rest of Brazil. In our scenario for improving job prospects in the Amazon, it is essential to reduce this distance and strengthen economic connections between the region and the rest of the world. These connections would boost the economy, generating jobs and income for the local population. Traditionally, investments in infrastructure and highways in particular are the safest bet for improving the accessibility of isolated regions. However, the environmental, social, and economic costs render this tactic unfeasible in the Amazon. An alternate solution for greater accessibility is to invest in the region's broadband internet infrastructure.

The strategic expansion of the Amazon's access to telephones and high-speed internet offers two major advantages. First, telecommunications make it possible to expand communication without the socioenvironmental risks that result from traditional infrastructure (expanding roadways). Second, broadband infrastructure has the potential to increase income and employment opportunities for local workers and entrepreneurs, as has other regions have demonstrated.

The Amazon paradox demands urgent action. It requires a new way of looking at the region, recognizing that opportunities offset the problems. The first essential step is to achieve zero deforestation, by combining policies that are known to work with new strategies that still must be tested out. As a reward, standing forests offer opportunities such as generating carbon credits and producing timber and non-timber products compatible with the conservation of these areas.

Forest restoration will make it possible to generate additional carbon credits, food, and industrial products. Improving the productivity of previously deforested areas will allow producers to meet the demand for agricultural products and free up more areas for further forest restoration. In turn, those restored forests will increase the production of environmental goods and services.

Finally, investing in urban infrastructure and capacity building would create opportunities to generate employment and income with less environmental impact. These investments would combine the best use of natural resources and the greatest benefit for the populations of the region, while also providing gains for the rest of Brazil. These measures are essential to ensure our national development and guarantee the future of the largest and richest tropical forest on the planet.

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Amazon; Logging; Unemployment; Sustainable development; Forest Restoration; Carbon Market; Forest-Compatible Products; Public policy

ABOUT THE AMAZON 2030
The AMAZÔNIA 2030 project is an initiative led by Brazilian researchers to develop a sustainable development plan for the Brazilian Amazon. Our objective is to provide conditions for the region to reach a higher level of economic and human development and achieve the sustainable use of natural resources in 2030

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