

Alana  
APIB Articulação dos Povos Indígenas do Brasil

Article 19

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Environmental Science Graduation Degree Program University of São Paulo

# — The Amazon needs a nature-based knowledge economy

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Final report organized by Alana, APIB, Articulação dos Povos Indígenas do Brasil, Article 19, Conectas Direitos Humanos, Engajamundo, Greenpeace, Social and Environmental Institute of Energy and Environment, Environmental Science Graduation Degree Program University of São Paulo.

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## 1.

The IPCC (Intergovernmental Panel on Climate Change) considers the reduction of deforestation in Brazil between 2004 and 2012 the largest contribution a country has made to fight climate change. Deforestation reached 27,700 square kilometers in 2004 and fell to 4,400 square kilometers just eight years later<sup>1</sup>. Both the reduction of deforestation (reversed from 2012, as shown in paragraph 12, below) and the existence of various forms of protected areas (extractive reserves, parks, indigenous territories, national forests, among others) in almost 50% of the Brazilian Amazon are democratic achievements, internationally recognized as the country's overall contribution to sustainable development. Between 2003 and 2009 Brazil accounted for 75% of the expansion of protected areas in the world<sup>2</sup>.

## 2.

Such a large reduction could lead to the conclusion that the problem of deforestation in the Amazon is solved and that the current deforestation is only a scattered remnant of little significance, and necessary for regional economic growth. After all, 25 million people live in the Amazon, and its demographic growth rate is much higher than that of the country as a whole, as shown in Chart 1 (page 4).

## 3.

This study presents empirical evidence that contradicts this conclusion. It seeks to show that in recent decades the Amazon's growth pattern has discouraged the strengthening of the regional economy, has not raised the population's standard of living and brought environmental damages that compromise agricultural production, itself. In 98.5% of the Amazon's municipalities, living conditions are worse than those in other Brazilian regions, according to the Social Progress Index<sup>3</sup>. The region's performance "is associated with a development model strongly marked by deforestation, extensive use of natural resources, and social conflicts." The conclusion of the Social Progress Index, denies the idea that increasing the areas that allow the conversion of forest for agricultural, logging, or mining activities is a socially desirable way to improve the living conditions of those living in the Amazon. On the contrary, predatory practices inhibit the emergence of nature-based knowledge economy, and stimulate the permanence of what, today can be called economy based on the destruction of nature.

## 4.

Also, the expansion of protected areas was not accompanied by public policies that ensure their integrity and, therefore, the ecosystem services that justify their protection. Land grabbing, illegal economic activities (mainly logging and minerals) and attacks on the traditional peoples who live in these territories continue to occur, as will be seen below.



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Legislation aimed at reducing or changing the nature of protected areas (often with the approval of the executive branch) signals local players that illegal activities can be rewarding. By the end of 2017, there were 33 anti-indigenous proposals in the National Congress, of which 17 sought to change the processes of Indigenous Lands demarcation, as shown by the Indian Missionary Council's work<sup>4</sup>. Since the early 1990s, more than 45,000 square kilometers of Conservation Units (which is the size of the state of Espírito Santo) has already been lost. The *Sistema Nacional de Unidades de Conservação*, or SNUC, (National System of Conservation Units)<sup>1</sup> could be the best-protected area management system in the world. However, because of the aggression it takes on, it is far from realizing its potential. As will be seen in this study, the abandonment of protected areas is socially harmful. It compromises Brazil's position as a recognized global environmental power, fomenting violation of the rule of law, sacrificing immense cultural patrimony, and bringing economic losses, not even close to what the income from the predatory extraction of these territories' resources pays.

## 5.

Despite their importance, protected areas are not enough on their own to maintain the ecosystem services offered by the forest. On private properties, it is fundamental that the legislation regarding the areas of permanent preservation and the legal reserve is respected, which is not the case today. Any flyover around the Xingu Indigenous Land shows the soybean plantations arriving at the edge of

the rivers, without any shrub vegetation that protects them. Brazil, which has the greatest biodiversity on the planet, cannot guarantee this asset only through protected areas if forest preservation and recovery on private land are not equally assured.

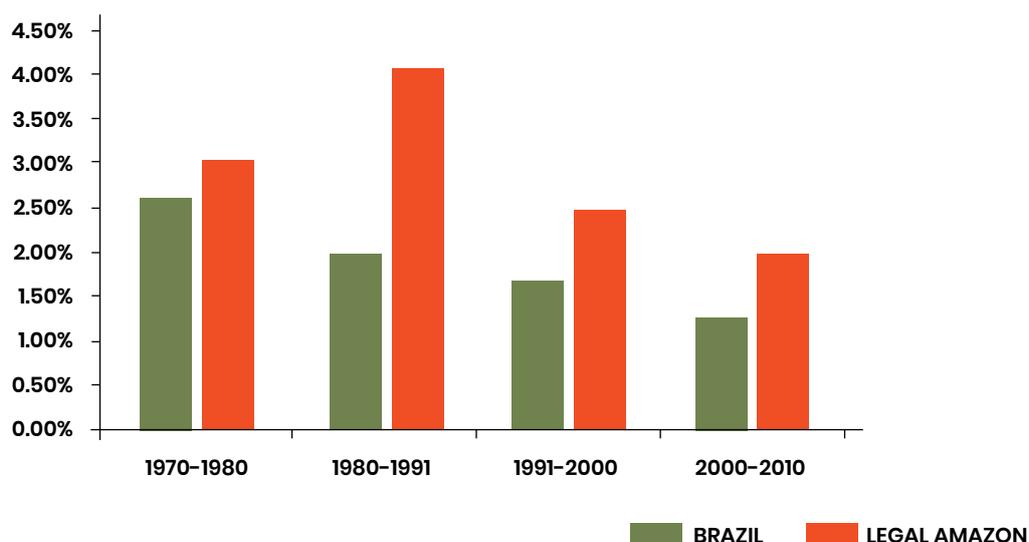
## 6.

This work consists of five topics. Initially, it shows that economic growth and the well-being of the populations living in the Amazon do not depend on deforestation because, where there is more deforesting is where the economy grows less, and the gap between the country's development indicators and those of the Amazon is greater. The second topic shows that the economic costs of stopping deforestation would be insignificant. Next, (the third topic) the study focuses on the importance of Conservation Units and the populations living within them, not only from the ecosystem services they provide but also from the underutilized potential for wealth and well-being generated from the economic practices of traditional peoples. However, as topic four shows, these areas are under threat and this threat compromises not only the region's economic development but the rule of law itself. Finally, topic five, the paper exposes information that undoes the myth that Brazil is the only country in the world to protect its forests. On the contrary, forest protection, far from being a national idiosyncrasy, is a global trend that accompanies the development process itself and which the country can lead internationally.

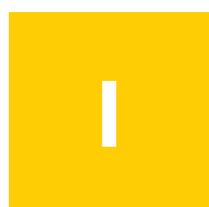
1 | Translator's Note (TN): The National System of Conservation Units (Sistema Nacional de Unidades de Conservação da Natureza, SNUC) is a formal, unified Brazilian system for federal, state and municipal parks created in 2000. Also, Brazilian legislation provides for two types of protected areas - especially protected areas (espaços territoriais especialmente protegidos) and conservation units (unidades de conservação). The term "conservation units" is the closest one to the IUCN protected area concept.

**FIGURE 1**

Legal Amazon's and Brazil's geometric mean annual growth rate of the population (%)



Source: IBGE (2014). Chart drawn by the author.



## – Deforestation is not a premise for the Amazon's growth

### 7.

The growth of Brazilian agriculture is no longer intensive on land. It is increasingly technologically-intensive. Between 1991 and 2017, grain and oilseed grains production in Brazil increased by 312%, but the planted area grew by only 61%, as shown by information from the Climate Observatory<sup>5</sup>. The area planted with soy in the Legal Amazon region increased from 1.14 million hectares in the 2006/07 crop to 4.5 million hectares in 2016/17. This is equal to 13% of the total surface area that Brazil devotes to the product<sup>6</sup>. Soya production standards in the region are also technologically intensive. The conversion to agriculture of areas with low pasture productivity is one of the pillars

of agricultural growth in the Amazon: since 2006, the area planted with soybeans has regionally grown almost fourfold, precisely on the areas previously focused on low-yield pastures<sup>7</sup>. The recently released EMBRAPA report<sup>2</sup> on the future of Brazilian agriculture highlights the “decoupling of total agricultural production and land use change”<sup>8</sup>. Forest destruction is therefore not a premise for increased soy production.

### 8.

The soybean production value chain linked to the Amazon is committed to getting large global traders' allegiance not to buy the product from newly deforested areas. The “soybean moratorium” brings together diverse players

2 | TN: Empresa Brasileira de Pesquisa Agropecuária (Brazilian Agricultural Research Corporation)

from the private and associative sectors: ADM, Amaggi, Bunge, and Cargill from the private sector. Articulação soja Brasil, Conservation Internacional, Greenpeace, IPAM, TNC, and WWF Brazil, from the associative sector, besides IMAZON, IMAFLORA and *Sindicato dos Trabalhadores Rurais de Santarém*<sup>3</sup>. The moratorium is the result of the recognition that deforestation involves reputational costs that threaten Brazil's exports and is not a necessity for the expansion of Brazil's role in international markets.

## 9.

The private sector's role in the effort to reduce deforestation is not a Brazilian peculiarity. A paper published in *Nature Climate Change*<sup>9</sup> shows that the commitments of different global value chains to reduce deforestation in the world reach 760 in March 2017 with the participation of 447 players among traders, industries, retailers and processors. Likewise in 2014, the New York Declaration on Forests (NYDF) advocating cutting of current forest losses in half by 2020 and zero deforestation by 2030 (which Brazil has not signed) was attended by supporters from 60 governmental entities, 59 private groups, and 73 civil society organizations.

## 10.

While this demonstrates the importance of combating deforestation from a reputational perspective for companies, agricultural producers, and their host countries, the *Nature Climate Change* article also stresses the insufficiency of these initiatives and the urgency in needing a wide range of government measures, creating an information infrastructure and the capacity to enforce the laws.

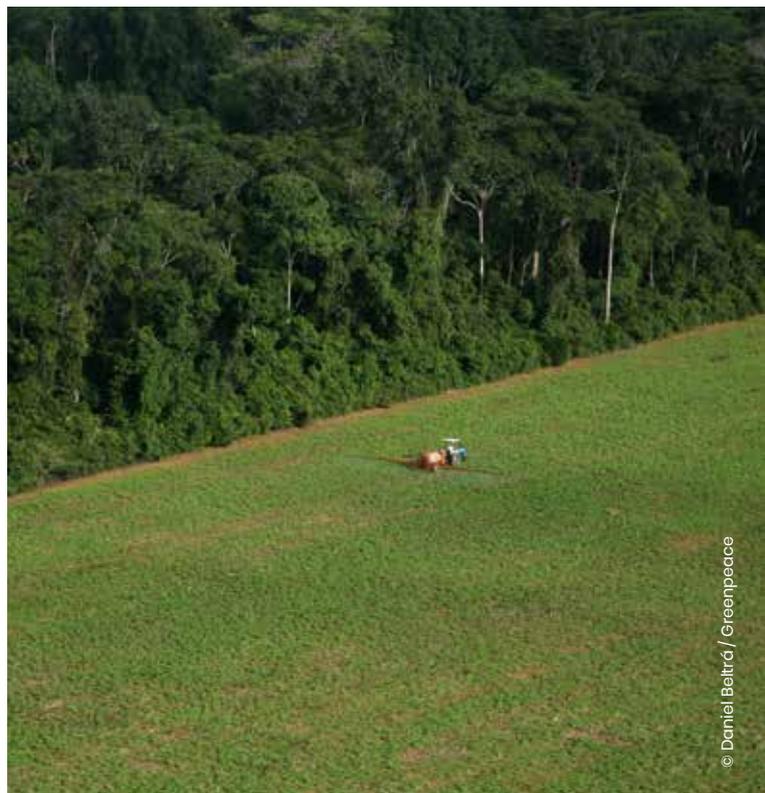
## 11.

Deforestation in the legal Amazon is directly associated with land ownership inequality. Rafael Feltran-Barbieri and collaborators show that, between 2000 and 2016, half of the deforestation in the legal Amazon occurred in 59 of the 772 regional municipalities. These

59 municipalities have an average Gini index<sup>4</sup> of 0.46 against 0.47 of the others, and there is no statistical difference regarding income inequality. However, landowner inequality measured by the Gini index, calculated on 17 size classes of rural establishments, is 0.75 for the 59 largest culprits of deforestation and 0.70 for the others (statistically different by the variance test  $p < 0.04$ ). The already exacerbated land owner inequality of the Legal Amazon - inequality that is 50% greater than the income inequality itself - is even higher among deforesting municipalities.<sup>10</sup>

## 12.

Graph II shows that the significant decline in deforestation in the Amazon region has been reversed since 2012. In 2015 and 2016 deforestation increased by 50% as compared to 2014. It is true that, in 2017, deforestation fell 16% as compared to 2016. Even so, according to data from the Climate Observatory<sup>11</sup>, in 2017 Brazil deforested 6,624 square kilometers in the Amazon. It is important to remember that Brazilian climate law determines that Amazon deforestation should fall to 3,920 kilometers by 2020<sup>12</sup>.

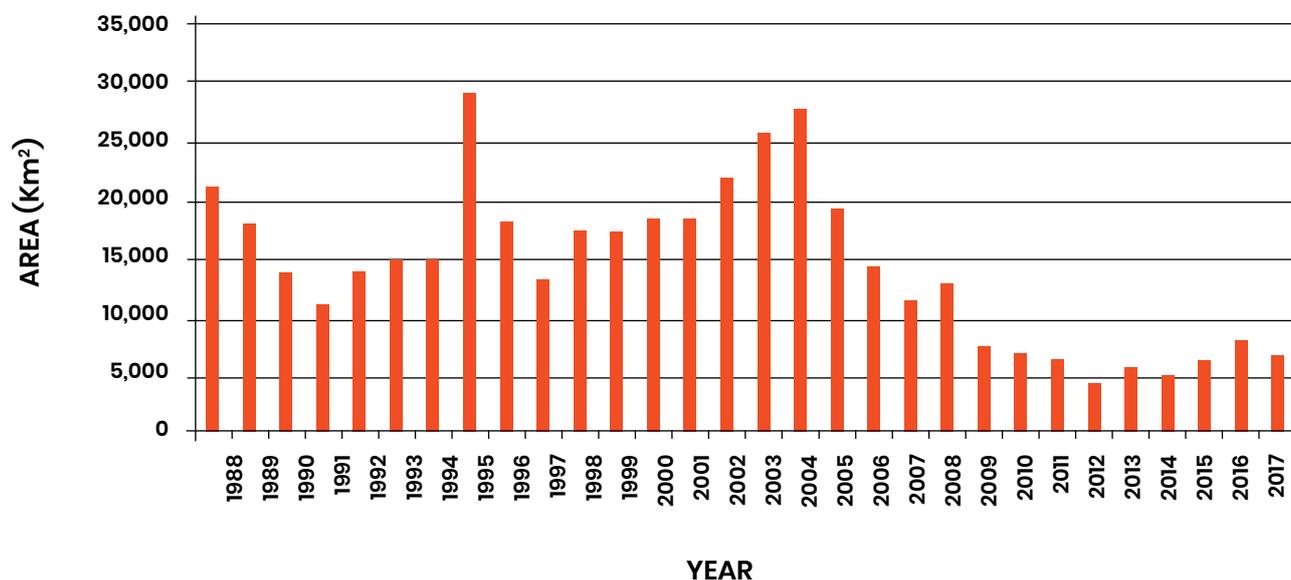


3 | TN: Rural Workers Union of Santarém

4 | TN: Sometimes called Gini index or Gini ratio, is a measure of statistical dispersion intended to represent the income or wealth distribution of a nation's residents, and is the most commonly used measurement of inequality - [https://en.wikipedia.org/wiki/Gini\\_coefficient](https://en.wikipedia.org/wiki/Gini_coefficient).

**FIGURE 2**  
Historical series of deforestation in the Amazon

### ANNUAL DEFORESTATION RATE IN THE LEGAL AMAZON



Source: Projeto de Monitoramento da Floresta Amazônica por Satélite (Amazon Forest Satellite Monitoring Project) (PRODES) (INPE/PRODES 2017)

## 13.

The recent rise in deforestation concerns not just government agencies and civil society activists, but also a significant set of business organizations. The *Coalizão Brasil Clima Florestas e Agricultura*<sup>5</sup> (which includes prominent agribusiness organizations and companies) cites studies showing the increase of forest destruction “within Conservation Units and in public areas not yet destined to a specific use and also in inserted rural properties in the Cadastro Ambiental Rural (Rural Environmental Registry), or CAR.” More than half of all deforested areas detected by INPE are in CAR.<sup>13</sup>

Coalizão Brasil Clima Florestas

## 14.

The predatory nature of Amazon deforestation is also evident in the fact that, with its 750,000 km<sup>2</sup> of deforested area, the region contributes

14.5% of the value of Brazilian agricultural product. São Paulo has an agricultural area of 193,000 km<sup>2</sup> and enters with 11.3% of the national production, as shown by the work of Carlos Nobre and collaborators<sup>14</sup>. This data shows the urgency and the possibility of promoting the decoupling between economic growth and deforestation in the Amazon.

## 15.

The deforested area in the Amazon is twice the size of Germany. 65% of this area, as shown by the work of IPAM<sup>15</sup>, is used for deficiently producing pastures, with less than one head of cattle per hectare. Between 2007 and 2016, the average deforestation of 7,410 km<sup>2</sup> per year resulted in a 0.013% increase in the Brazilian GDP, according to a document from *Grupo de Trabalho pelo Desmatamento Zero* (Zero Deforestation Workgroup) submitted at COP 23, in Bonn<sup>16</sup>.

5 | TN: Brazilian Climate, Forests, and Agriculture Coalition

## 16.

In 2016, Brazil was the seventh-largest GHG emitter (2,278 billion tons). Of this total, 51% was caused by deforestation, as shown by information from the Zero Deforestation Workgroup<sup>17</sup>. According to data from the Climate Observatory, another 22% of our emissions originate in agriculture, by the fertilizer consumption and herd methane. If in the case of agricultural emissions there are noteworthy technological challenges to reduce emissions, this cannot be affirmed with regard to deforestation, which derives from institutionalized tolerance with illegal practices whose social and economic utility is practically nil. That compromises the future of Brazil not only as an environmental power but as a territory where traditional peoples, permanently attacked by the threat to their lands, guard and value an extraordinary cultural patrimony.

## 17.

The United Nations Food and Agriculture Organization (FAO/UN) compares net GHG from agriculture and the change in forest cover in several countries (table 1). As a result, in Brazil, in 2015, while changes in land use and land cover (agricultural emissions – agricultural capture + deforestation capture from reforestation) had net emissions of 309 million tons of CO<sub>2</sub>, other countries were already capturing more GHG than they were emitting. China had a net carbon sequestration of 314 million tons, and the European Union had 428 million tons. Thus, although agriculture in all countries continues to emit more than is sequestered, in the European Union, China, the United States, Australia, and even in Uruguay, net sequestration from forests far outweigh net emissions from agriculture and livestock. In Brazil, the opposite is true, with forest emissions adding to agriculture and livestock, making the total emitted the second highest in the world. Brazil is second only to Indonesia where agriculture develops at the expense of burning forests on peaty soils.

**TABLE 1**

M t CO <sub>2</sub> eq (2015)	FOREST*	AGRICULTURE AND LIVESTOCK**	
<b>Indonesia</b>	<b>998</b>	<b>471</b>	
<b>Brazil</b>	<b>294</b>	<b>15</b>	
<b>Nigeria</b>	<b>183</b>	<b>8</b>	
<b>Tanzania</b>	<b>161</b>	<b>60</b>	
<b>The Democratic Republic of the Congo</b>	<b>145</b>	<b>23</b>	
<b>Paraguay</b>	<b>142</b>	<b>2</b>	
<b>India</b>	<b>112</b>	<b>10</b>	
<b>Mexico</b>	<b>7</b>	<b>1</b>	
<b>Uruguay</b>	<b>-11</b>	<b>0</b>	
<b>Australia</b>	<b>-73</b>	<b>7</b>	
<b>United States</b>	<b>-193</b>	<b>152</b>	
<b>China</b>	<b>-314</b>	<b>2</b>	
<b>European Union</b>	<b>-517</b>	<b>89</b>	
<b>Rest of the World</b>	<b>-26</b>	<b>665</b>	
<b>Total</b>	<b>1067</b>	<b>1998</b>	

\* Includes other ecosystems

\*\* Includes agriculture, livestock, and biomass burning

## 18.

20% of the Amazon territory has already been deforested. In 1960, as Adalberto Veríssimo of IMAZON shows, this total was only one percent<sup>18</sup>. The turning point from which the forest can undergo a severe desertification process (compromising the regions' productive capacity and the ecosystem services provided by the forest, starting with the supply of water) is usually estimated at 40%. However, recent work by Thomas Lovejoy and Carlos Nobre, published in the prestigious *Science Advances*<sup>19</sup>, shows that if the impacts of forest clearing are added to the effects of both climate change and logging that weaken the resilience of forest ecosystems, the point of turning towards "savanization" and the affected areas' possible desertification may be in the range close to what has already been deforested until now. The work of Nepstad and collaborators, published in *Nature*<sup>20</sup>, gives a detailed analysis of these other sources of fragilization of forest environments and which corroborate Lovejoy and Nobre's point of view: the turning point from which the risk of desertification in the Amazon increases drastically seems closer than what was typically estimated.

## 19.

This process of savanization and the possible desertification resulting from it does not just pose a danger for the Amazon. The Amazon's evapotranspiration is fundamental for the rains that ensure agriculture's viability in the Central-Southern part of Brazil and other Southern regions of the Latin American Continent. The reservoirs that supply the Southern continental major metropolitan regions are also dependent on the hydrological cycle that have their epicenter in the forest. Deforestation damages this cycle and can have catastrophic consequences for both agriculture and the water supply. The droughts of 2005, 2010 and 2015-16 should be considered, as Lovejoy and Nobre show, expressions that the Amazon's ecological turn is closer than previously believed.

## 20.

One of the climate change's most damaging effects is to increase the fire susceptibility in tropical forests. The 36% increase in fires in the Amazon in 2015 (as compared to the previous 12-year average) is attributed to climate change<sup>21</sup> according to a study from INPE researchers published in *Nature Communications*. 2017 was the record year of fires in the country since the measurements began. In all, there were 275,120 recorded fires, of which 132,000 were in the Amazon. Just in Pará did the burnings increase by 200% in 2017, as compared to the previous year<sup>22</sup>. Persisting in the current deforestation level is opening the way for the rainforest to convert from a carbon sink to a GHG emitter: "the risk is that, with higher temperatures and longer drought periods, plant respiration may exceed photosynthetic rates so as to make forests a net source of GHG emissions..."<sup>23</sup>.

## 21.

Tropical forests promote biodiversity and perform ecosystem functions relating to the water cycle and carbon storage, which makes their destruction a threat to both the people who directly depend on them and the human species as a whole. Tropical forests shape environments that are much more fragile and sensitive than those of temperate climates. Contrary to temperate areas, forest destruction in the tropics is more likely to result in desertification. In the classic 1952 book, from which the term was first used, "The Tropical Rainforest," P.W. Richards shows that temperate forests have greater regenerative capacity when their vegetation is suppressed than tropical forests.

## 22.

This is one of the reasons why it is fundamental to protect an area of 70 million hectares (more than the entire surface of the South of Brazil) covered by forests in the Amazon and currently at the mercy of illegal squatters and deforesters<sup>24</sup>, as shown Claudia Azevedo-



Ramos from the Center for High Amazonian Studies (NAEA / UFPA) and Paulo Moutinho from IPAM in an article published in the *Land Use Policy*, a prestigious scientific journal<sup>25</sup>. The researchers show that these 70 million hectares, twice the surface area of Germany, store 25 billion tons of carbon dioxide, which is the fourteen-year sum of Brazilian emissions. It is urgent that these areas are protected! They are subject to action from land grabbers and culprits of deforestation, precisely because they are not legally delimited. In total, 25% of deforestation recorded in the Amazon between 2010 and 2015 occurred in these unprotected public areas. The study also shows that, given the already deforested and underutilized Amazon areas, it makes no economic sense that they could be destined to conventional forms of agricultural activities. Therefore, the study proposes protection-based mechanisms that stimulate sustainable use of the forest.

## 23.

The *Atlas da Agropecuária Brasileira*<sup>26</sup> (Atlas of Brazilian Agriculture), composed by Imaflora, in partnership with Geolab - Esalq-

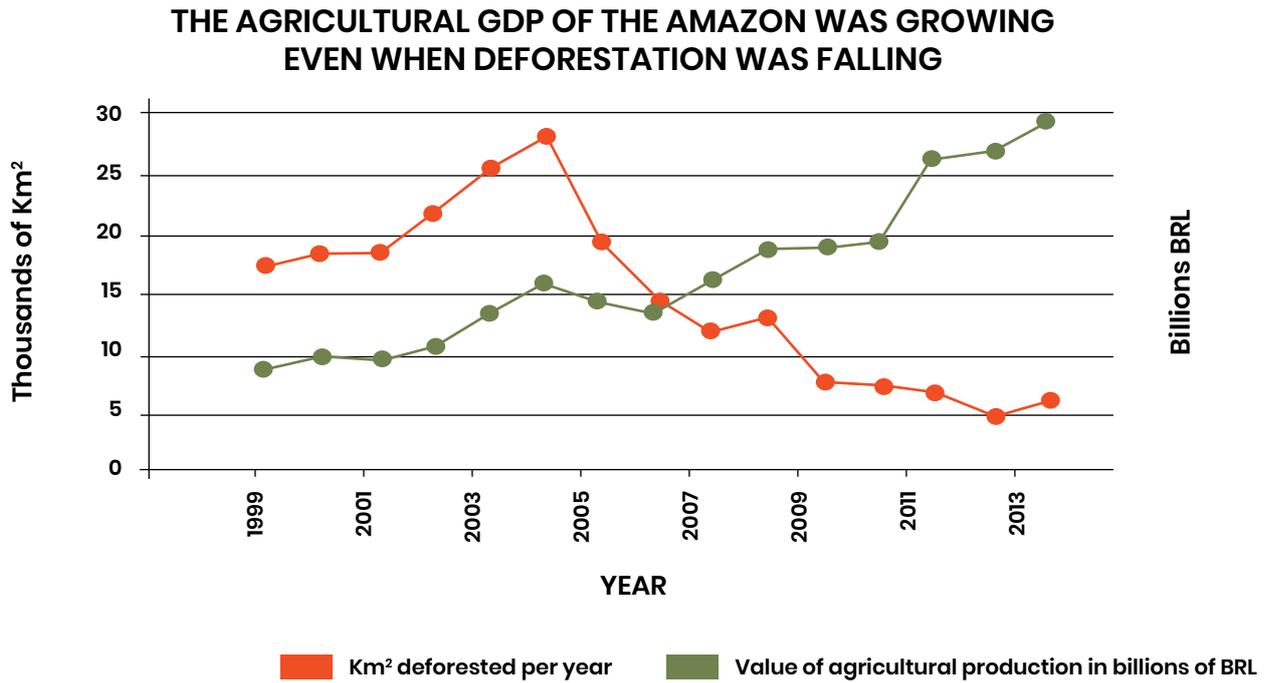
USP, and supported by FAPESP, corroborates the information of Cláudia Azevedo-Ramos and Paulo Moutinho and enlarges the carbon stocks analysis of what is contained in the forests, applying it for the private properties. Despite the importance of protected areas (which integrity is under threat from illegal logging, clandestine mining, and land grabbing, as will be seen in part four of this study), the fact that a quarter of the forests are unprotected and subject to deforestation can no longer be denied. Seven thousand large properties in the Amazon accumulate 15% of Brazil's unprotected carbon, while another 110 thousand small properties own another 10%. The risks are even greater in the Cerrado, where 30 thousand properties accumulate 25% of the unprotected national carbon, according to an article published in the prestigious *Global Change Biology*<sup>27</sup>.

## 24.

A reduction in deforestation is not conducive to a reduction in production. The graph below shows the Amazon's GDP for agriculture and livestock has grown, in spite of deforestation declining.

**FIGURE 3**

The Amazon's agricultural GDP increased in the years when deforestation fell

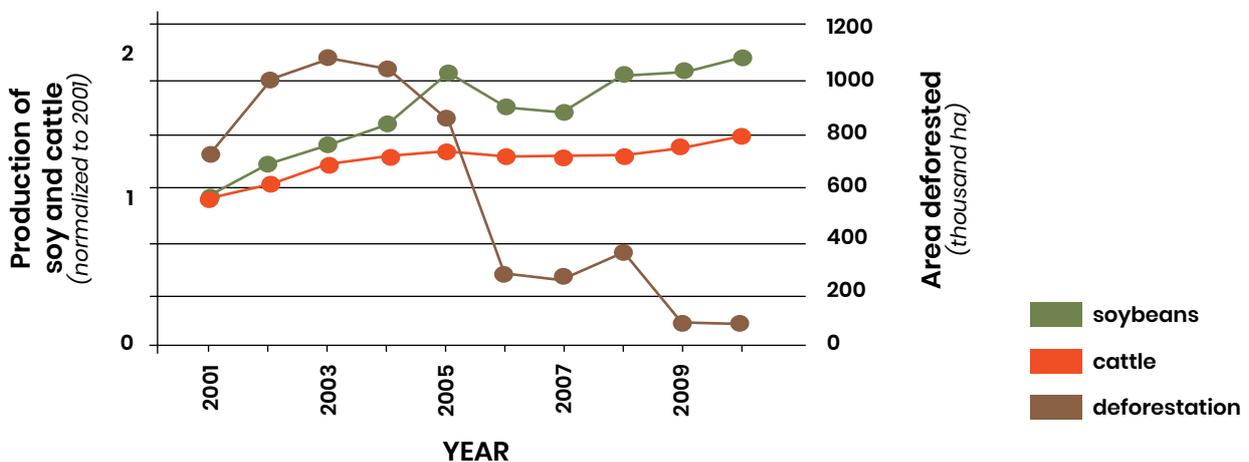


## 25.

In the State of Mato Grosso deforestation fell from a total of 6,800 km<sup>2</sup> (period average between 1990 and 2006) to 1,650 km<sup>2</sup> (between 2007 and 2012), while both soy and meat production increased, as shown by figure 428, just below.

**FIGURE 4**

The Amazon's agricultural GDP increased in the years when deforestation fell



## 26.

To persist at deforestation can jeopardize agricultural performance. In the year 2000, Mato Grosso's forests contributed with 50 annual cubic kilometers for evapotranspiration in the State. By the end of the decade, in 2009, this amount had dropped by about one cubic kilometer per year due to deforestation. In 2009 evapotranspiration reached only 40 km<sup>3</sup>. The damages from this reduction of the ability to capture and pump water into the atmosphere are, of course, immense, as shown by the work of Lathuillère and his collaborators<sup>29</sup>, with emphasis on rainfall pattern, prolonging drought periods, and increasing storm severity.

## 27.

Converting large areas of the Cerrado (part of which is in the Amazon) into an agricultural area is also compromising the water cycle. Between 2003 and 2013, the area of crops in the Cerrado went from 1.2 million to 2.5 million hectares. 74% of the new crop areas came from previously intact vegetation. This reduced the amount of water recycled into the atmosphere from evapotranspiration. In 2013 alone, agricultural crop areas recycled fourteen cubic kilometers less than if these areas had not been deforested, as shown in the article by Spera and colleagues in *Global Change Biology*<sup>30</sup>.

## 28.

The EMBRAPA report "Visão 2030: O Futuro da Agricultura Brasileira"<sup>31</sup>,<sup>6</sup> shows that climate change is expected to cause agricultural losses of 7.4 billion USD in 2020 and 14 billion USD in 2070. Soybeans would suffer the most considerable loss, but products such as coffee, corn, rice, beans, cotton, and sunflower would also be affected.

## 29.

Deforestation's predatory nature is expressed, above all, in its results: areas unconducive to agriculture and cattle raising, generate

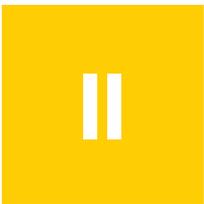
low productivity. According to Adalberto Veríssimo, a senior researcher at IMAZON<sup>32</sup>, 70% of the deforested area in the Amazon is idle. Brazil already has 240 million hectares (about one-third of its territory, including the Amazon) of areas open for agriculture, pasture and planted forests.

## 30.

According to a study by Instituto Escolhas, even the areas in the Amazon that can be legally deforested (i.e., private areas that are not legal reserves or permanently protected areas), only 27% have agronomic potential that justifies their use. In the Cerrado, only 13% of the legally deforested areas have the potential for agricultural productivity<sup>33</sup>. These numbers are significant because they mean that the best destination for areas that are not conducive to high productivity agriculture is forest regeneration and the provision of the ecosystem services associated with it. In the Cerrado, the area currently occupied by unproductive pastures is already sufficient to meet global and domestic demands for meat and grain by 2040, without the need for further conversion of natural areas, as shown by Bernardo Strassburg and colleagues, in an article published in *Nature Ecology and Evolution*<sup>34</sup>.

## 31.

In short, there are no economic reasons that justify the persistence of deforestation in the Amazon. Economic growth and the strength of agriculture, even that of the Amazon, are not dependent on deforestation. Forest loss is an agricultural threat throughout the country, and also to the supply of ecosystem services on which all (inside and outside of Brazil) depend. The next item examines the losses resulting from the immediate interruption of deforestation. The policies that could contribute for this interruption are not the scope of this study. It is important to stress that the economic activities hampered by deforestation's end are those with lower significance and lack of content in intelligence, information, and knowledge.



## – The costs of zero deforestation are low

### 32.

The economic losses resulting from the end of Amazon deforestation, at the national level, are derisory, although, locally, negative impacts can be detected for those dependent on these criminal and predatory activities. “What would be the social and economic impacts if we adopted a zero-deforestation policy?” This question guides the study published in 2017 by Instituto Escolhas in collaboration with IMAZON, IMAFLORA, and Geolab of ESALQ /USP<sup>35</sup>. The answer is clear: “If all deforestation and the consequent expansion of the agricultural frontier in Brazil would end immediately,

whether legal or illegal, including public and private lands, there would be minimal impact on the country’s economy. It would mean a reduction of only 0.62% of GDP accumulated between 2016 and 2030, which would correspond to a GDP decrease of 46.5 billion BRL over 15 years or 3.1 billion BRL per year. “ As the study points out, this is a ridiculous figure: in 2017, the Plano Safra subsidies (embedded in the policies that finance agriculture in Brazil) alone were 10 billion BRL.

The 0.62% GDP loss from the end of deforestation by 2030 is considered a social cost, by the study.

## 33.

The losses in the states where deforestation prevails, would be greater than national losses. While the Southern, Southeastern, and Northeastern states, in the zero-deforestation scenario, have declines in their GDPs of less than 0.5% by 2030, the picture changes in the Amazon: in the zero-deforestation scenario until 2030, Acre would lose 4.53% of its GDP, Mato Grosso 3.17% and Pará 2.05%.

## 34.

As one might expect, one of the conclusions of this study is that the less qualified categories among the Amazonian workers are those who will experience the highest wage losses as a result of the end of the predatory and low-paid activities to which they so often are linked. Tolerating the continuation of deforestation for supposedly social reasons is perpetuating predatory activities, most often illegal and associated with degrading working conditions.

## 35.

Instituto Escolhas concludes that “zeroing, or even just reducing deforestation and ending the expansion of the agricultural frontier in Brazil would have a meager impact on the country’s economy and practically no social losses.” The expected losses in livestock activity could be fully offset by very gradual improvements in productivity.

## 36.

Compliance with what the country publicly announced in Paris in 2015 – the recovery of 12 million hectares of forests by 2030 – is a private investment opportunity, but it is mainly a component of strengthening the environmental conditions for the expansion of agricultural production itself. Natural pasture restoration, The Nature Conservancy’s recent report shows “has become a potential agribusiness productive chain”<sup>36</sup>.

## 37.

With regard to forest recovery, its rate has not exceeded 100,000 hectares per year. This corresponds to 0.9% fulfillment of what the country has committed to at the Paris Conference in 2015. At this speed, it will take at least 120 years to meet the established goal<sup>37</sup>. In addition to its ecosystem benefits, the forest restoration economy represents an opportunity to create jobs, income, and innovation, in which Brazil has the technical conditions to occupy an internationally prominent position. If the public policy signs are adequate, there is “an entire productive chain with its different segments (seed collection and production, seedling nurseries, plant maintenance, technical assistance, monitoring, etc.) that are now incipient in the scenario’s projected activity. In the United States, for example, the areas’ recovery generated 126,000 direct jobs, more than the American coal, wood, or steel industries. For every 1 million USD invested in the activity, there were 33 jobs generated<sup>38</sup>.”

## 38.

The investments necessary for the reforestation in which the Country has internationally engaged are within reach of its economic possibilities. According to a study by Instituto Escolhas<sup>39</sup>, the cost of reforesting 12 million hectares varies from 31 billion BRL to 52 billion BRL, depending on the restoration methods. In the case of higher cost, this means 3.7 billion BRL annually over fourteen years, with the creation of 250 thousand jobs and a collection of 6.5 billion BRL in taxes. The annual expense would correspond to only 2.3% of the credit yearly destined to agriculture. This is an approximate number, and it has many conditions. It involves only the Atlantic Forest and the Amazon. It does not include the Cerrado because there is no data available to make this type of calculation. The information that gave rise to this issue originated in the reforestation industry. It is likely that other organizations (including communities living in forest areas) will have technology capable of making these activities cheaper, especially when planting native species.

## 39.

One of the most important conditions for the Amazon's substantial reduction of deforestation is the improvement in the conditions of the country's pastures as a whole and particularly, in the region. That is why Brazil has taken on the voluntary goal at the Paris Climate Conference to recover 15 million hectares of degraded pastures and expand the areas of crop, livestock, and forest integration systems by 5 million hectares by 2020. This would require investments in pasture recovery between 27 BRL and 31 billion BRL and almost 8 billion BRL in integration systems.

## 40.

In summary, the losses resulting from the end of deforestation fall on activities that a modern democratic society should overcome, those that concentrate on extractive and often illegal activities, far removed from a contemporary economy's technological innovations. These activities differ, as we will see below, from those that, in an incipient but promising way, are developed within the various types of Conservation Units in the Amazon.



## – Protected areas are an asset for Brazil

## 41.

Conservation Units occupy 18% of the Brazilian territory, that is, 152.4 million hectares. 73% of this area (111 million hectares) is in the Amazon. 37% of it is for "natural use" (they are intended for nature preservation and only allow indirect use of their attributes), and 63% is for sustainable use (make preservation compatible with the collection and use of forest resources, with adequate techniques for forest preservation)<sup>40</sup>.

## 42.

The set of the Amazon's protected areas (reaching almost half of its territory) is a democratic achievement that brings at least three positive results to the Country.

Firstly, protected areas form the basis of strengthening indigenous peoples' communities, thus contributing to partially repairing the destruction and violence to which these peoples have been, and are, victims. The material and immaterial culture of the Amazon's traditional populations brings teachings that the Country knows little of and still, does not value. Secondly, these territories strengthen the condition of Brazil as the country with the greatest biodiversity on the planet and, consequently, allow the development of intelligent global policies to remunerate our provision of environmental services. The Amazon Fund is just one example that can be followed by financial investments coming from the private sector, if there are policies in this direction. The global ecosystem services the Amazon provides have been

systematically exalted by Brazilian authorities, at international conferences, and Brazil is rightly asking that these services be recognized from an international economic angle. Thirdly, these territories not only offer products and possibilities for generating income for those who depend on them, but they have an immense potential for generating innovation that science is still far from using or even knowing.

## 43.

More than 30% of the water consumed in the country is taken directly from or sourced downstream from protected areas. This protection means that these sources remain clean, requiring little investment in water treatment. In addition, 79% of the water responsible for generating hydroelectricity in Brazil originates in protected areas.<sup>41</sup>

## 44.

In all, 170 indigenous peoples, totaling 450 thousand people, live in the Amazon's Indigenous Lands and speak different languages grouped in 14 different language families. Estimates show that there are 46 isolated or low contact indigenous groups. This is a cultural heritage of which any country should be proud, but which, as will be seen in topic four, below, is being systematically destroyed and often with the State's and local political representation's approval.

## 45.

Conservation Units and especially Indigenous Lands tend to be the most preserved in the Amazon. Once an Indigenous Land is legally recognized, the expectation of legalizing its undue appropriation by invaders is low. This is one of the central reasons explaining how only 1.3% of deforestation in the Amazon comes from Indigenous Lands<sup>42</sup>.

## 46.

Globally, the forests on which traditional communities have rights contain nearly 38 billion tons of carbon, which is 29 times more

than the entire world's car fleet's carbon footprint, according to the World Resources Institute<sup>43</sup>. The same study estimates the gains from the maintenance of Indigenous Lands' forests, based on what is internationally known as carbon's social cost and which the US government established at 41 USD/tCO<sub>2</sub> (41 USD per ton of carbon, in 2015). Taking into account the carbon stored in each type of forest, WRI estimates that the average benefit of avoided deforestation (because the Indigenous Lands are demarcated and thus preserved) is 14 USD per hectare in Brazil (this amount increases to 40 USD in Bolivia and 6 USD in Colombia).

## 47.

However, in addition to carbon storage, forests provide other systemic services, whose assessment was also part of WRI's work. As the supply of these services does not go through the price system, economists calculate their value for what it would cost to produce them if destroyed by forest devastation. Of course, the result of these calculations cannot be exact. However, it shows that Conservation Units (and especially Indigenous Lands) produce utilities whose value exceeds that of any economic activity put in their places. The lack of payment for these utilities cannot be a justification to have deforestation eliminate what they offer.

**TABLE 2**

ECOSYSTEM SERVICES	AVERAGE	LOW	HIGH
Hydrological services	287	175	400
Nutrient retention	150	100	200
Regulation of local climate and water cycle dynamics	113	55	170
Pollination	45	40	50
Value of existence	15	5	25
Recreation and tourism	5	3	7

Fonte: [https://www.wri.org/sites/default/files/Climate\\_Benefits\\_Tenure\\_Costs.pdf](https://www.wri.org/sites/default/files/Climate_Benefits_Tenure_Costs.pdf)

## 48.

The total value, estimated by the World Resources Institute, for ecosystem services for water regulation, soil protection, and carbon sequestration in the Brazilian Amazon Indigenous Lands, Bolivia, and Colombia is 1.13 trillion USD. 75% of this total corresponds to Brazilian contribution<sup>44</sup>. It is important to note that the costs to obtain such results correspond to 1% of the benefits. WRI's work shows that ensuring the integrity and broadening of Indigenous Lands is among the most cost-effective ways to combat climate change, in comparison to reducing emissions from coal or gas, for example.

## 49.

There are 223 Indigenous Amazon Lands awaiting the final homologation steps and demarcation process. Its surface reaches 9.5 million hectares inhabited by 126 thousand people. These territories store 11 billion tons of carbon<sup>45</sup>. As Antônio Donato Nobre shows, the deforestation of these areas, now threatened by mining, the expectation of legalizing land grabbing, and timber exploitation would lead to a regional temperature increase

between 4.2 and 6.4 degrees, with disastrous impacts on the water cycle<sup>46</sup>. There is no way to estimate the economic value of avoiding such a disaster. However, it is clear that this value depends on the maintenance of the Indigenous Lands' integrity, which increases (and not only for the natives themselves) the interest and urgency for their demarcation.

## 50.

Conservation Units are not and cannot be considered untouchable areas, averse to economic activities. On the contrary, one of the conditions for the ecosystem functions' preservation is that they shelter traditional populations; indigenous peoples, riverine, and extractive economy-based communities whose material culture makes the use of the forest and its preservation compatible. Among the most promising activities, in this sense, is tourism that already moves approximately 4 billion BRL per year, generating 43 thousand jobs<sup>47</sup>. Community-based tourism generates income and stimulates managerial skills in the community. There are currently 23 community tourism initiatives located in 10 Brazilian states in more than 100 municipalities. Rede Turisol<sup>48</sup> is an example of this type of initiative. Several indigenous communities already develop ecotourism initiatives<sup>49</sup>.

## 51.

In contrast to the criminality that prevails in illegal logging and timber (as will be seen in the next topic), forest management of timber is extremely promising if sought in a planned manner. *Programa Madeira Legal* (Legal Wood Program) was signed by twenty-eight organizations, including the State and Municipal Governments of São Paulo, the Sindicato da Indústria da Construção Civil de São Paulo, or SindusConSP<sup>7</sup>, Sindicato do Comércio Atacadista de Madeiras do Estado de São Paulo, or Sindimasp<sup>8</sup>, Associação Paulista de Empresários de Obras Públicas, or APEOP<sup>9</sup>, Associação Brasileira dos Escritórios de Arquitetura, or AsBEA<sup>10</sup>, and the Centro de Estudos em Sustentabilidade da Fundação Getúlio Vargas, or GVCes<sup>11</sup>, in addition to the WWF. One of the components of this program is the implementation of the management regime in the forest exploitation: an area is divided into exploited plots, one each year, ranging from 25 to 35-year cycles. Mature trees are withdrawn from a plot, while young ones continue to grow<sup>50</sup>. Income generation is continuous over time, unlike the predatory exploitation that depletes the resource and, with it, the future generation potentials of income and well-being. Rodrigo Medeiros and Carlos Eduardo Young<sup>51</sup> show that the potential income generated by timber production in the National and State Forests of the Amazon, based on management and following the forest concession model, ranges from 1.2 to 2.2 billion BRL, much more than what the value of what is destructively extracted in the region today.

## 52.

One of the most important forms of sustainable logging is community management. In the Amazon, its potential rises to 47 million hectares, with the prospect of generating 1.2 to 2.2 billion BRL annually<sup>52</sup>. It is interesting to note how the legalization of this activity attracts cutting edge technology for its success. This is how the Bolsa Verde of Rio de Janeiro (BVRio) is using blockchain

(the decentralized techniques underlying virtual currencies) to track and certify the wood's origin<sup>53</sup>. It will be an important sign of development and democracy when logging is no longer associated with crime, evasion, and destruction, but with sustainability and technological innovation.

## 53.

One of Brazil's major challenges to reforest the 12 million hectares it committed to at the Paris Climate Conference is the cost reduction of this activity. In fact, for the most part, cattle ranchers and farmers with activities in the Amazon do not dominate planting technologies nor do they know the native species with which it can and should be carried forward. In this sense, Rede de Sementes do Xingu<sup>54</sup> the (Xingu Seed Network), led by the Instituto Socioambiental (Socioenvironmental Institute) brings highly promising teaching. Indigenous and riverine populations that know the forest deeply collect seeds that are analyzed and classified by technicians and sold to farmers who need to have their areas reforested. Until this, the effort of planting seedlings was often frustrating and costly. With the association between contemporary agronomic knowledge and traditional knowledge, these costs were significantly reduced. Also, the activity generates income for the seed collectors and reduces the tension between them and the farmers, who have come to value and respect these traditional activities. This is an example where maintaining and enhancing biodiversity generates multiplier effects, capable of benefiting not only the traditional populations but also the agricultural activity itself. This not only fulfills its legal obligations of forest recovery, but also has an asset that benefits its production in terms of climate, pollination, and biodiversity.

## 54.

The sustainable economic activities in the Conservation Units also involve different modalities of extractivism. Until very recently, the extractivism practiced by the indigenous

7 | TN: São Paulo Civil Construction Industry Union  
8 | TN: São Paulo State Wood Wholesalers Union  
9 | TN: São Paulo State Association of Entrepreneurs of Public Works

10 | TN: Brazilian Association of Architecture Firms  
11 | TN: Center for Sustainability Studies of the Getúlio Vargas Foundation

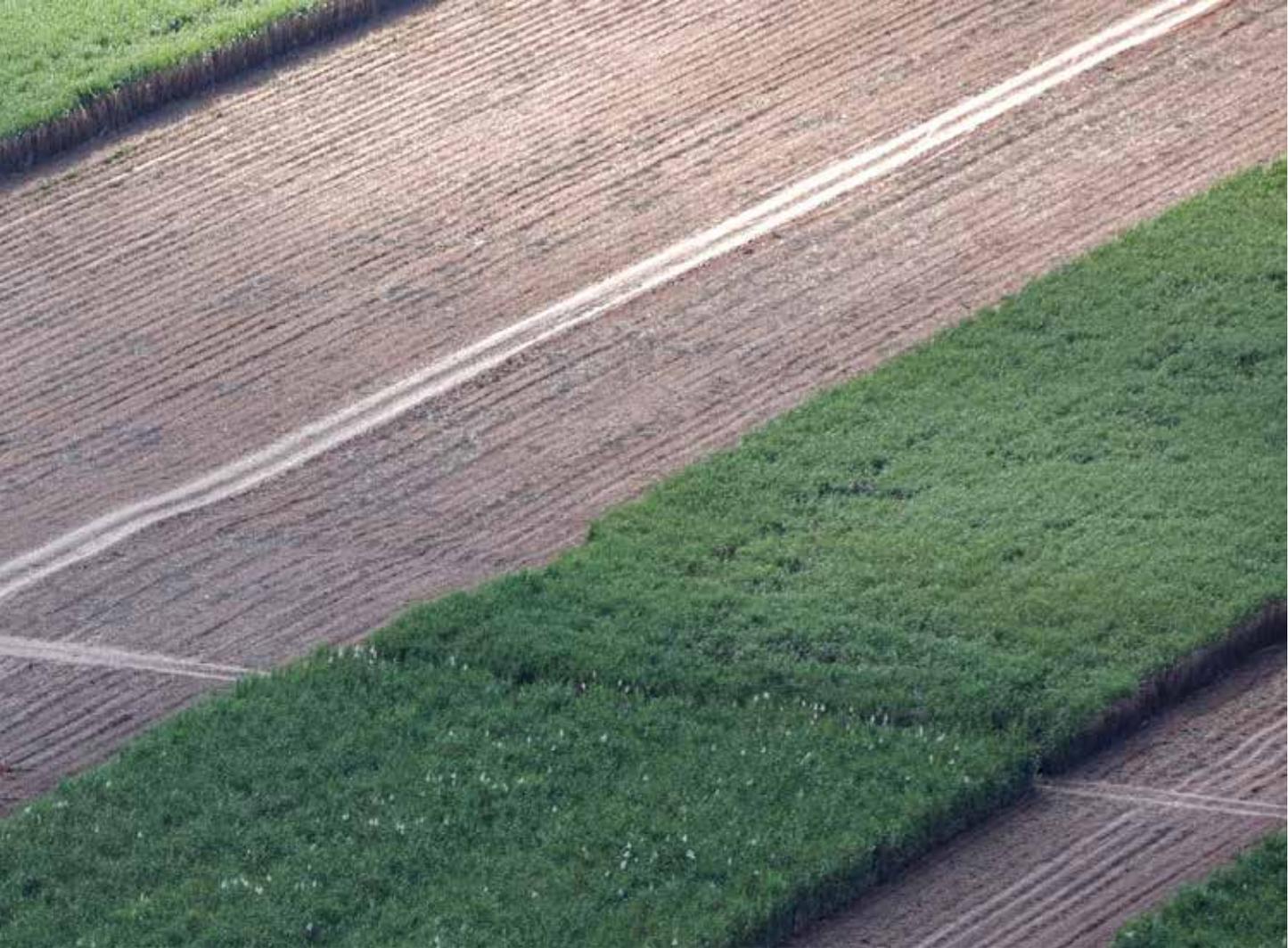


and riverine populations were subject to market rules in which the riverboat merchants (known in the Amazon as *regatões*) were very powerful in establishing the prices of the products sold, as well as those that the locals bought. These prices did not stimulate economic activity and discouraged the younger generation who saw no prospect of a better future in the places where they were born and the culture in which they grew up. Recently, several organizations and, above all, the Instituto Socioambiental, have carried out initiatives, in Terra do Meio, in Xingu, that have allowed this situation to change. On the one hand, they trained local populations to respond to the management of products needed for local consumption. At the same time, they helped the indigenous and the riverine populations to become protagonists in selling the products they collected, placing them directly in contact with companies interested in this production. Thus, large companies such as Wickbold (industrialized bread), and Mercur (rubber) began to establish commercial relations with the local

populations but based on understanding the specific economic logic of these places. These initiatives have been attracting the interest of young local populations and reversing their mass exodus experienced until recently. The book “Xingu. Stories of Forest Products” presents a rich overview of these initiatives. Rodrigo Medeiros and Carlos Eduardo Young estimate that, just in the eleven Extractive Reserves that they examined that rubber production can yield 16.5 million BRL per year. In the 17 Extractive Reserves that analyzed the Brazil nut-harvesting income generation potential, it totals 39.2 million BRL .

## 55.

The greatest challenge of Amazon sustainable development lies in the transition from the predominant predatory growth model to what the geographer, Bertha Becker, called the nature-based knowledge economy. Carlos Nobre and his collaborators insist on the need for a new paradigm for sustainable Amazon development. This paradigm combines



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the traditional populations' knowledge with the methods brought by the 4th Industrial Revolution, whether in predatory activities monitoring or, above all, to increase product knowledge and exploration of products whose composition and usefulness is still little-known today. The Amazon can be seen as "a public asset of biological goods capable of creating high value, innovative products, services, and platforms through the combination of advanced biological and digital media and fourth industrial revolution technologies"<sup>55</sup>.

## 56.

In short, the vast territories in Protected Areas have immense wealth. Conventional methods of exploitation (expanding the agricultural frontier based on forest elimination, mining, and destructive logging) can bring immediate benefits, but they destroy a potential that has so far been hardly recognized by society itself. However imprecise the calculation of the monetary value of the ecosystem services provided

by the standing forest may be, they certainly surpass, (especially if considering a period of decades rather than years), the product that can be obtained by the conventional forms of territory occupation. Also, standing forests generate income and have immense potential to be the basis for technological innovations. Improving life and expanding the opportunities for traditional populations to maintain their culture and generate income through activities compatible with environmental preservation where they live is one of the basic conditions for the Amazon's sustainable development. Improving life and, work conditions, the autonomy of traditional communities, and strengthening the projects for the riverine and indigenous peoples to offer the services provided by the forest to society is not only an aspiration for themselves but a parameter that can measure their degree of development as a society. However, as will be seen below, the protected areas of the Amazon and their sustainable development are under attack.

# IV

## – Protected areas are under attack

### 57.

It is shocking, the contrast between the boldness of democratic Brazil to preserve half of the Brazilian Amazon and the inability of this determination to be effectively respected. More than one-third of the recent deforestation in Mato Grosso occurred in areas with no defined land category<sup>56</sup>. Those are areas likely to be in the public domain, and that deforestation aims to privatize. Estimates of non-target areas in the Amazon range from 70 to 80 million hectares, as seen in paragraphs 23 and 24, above. Allowing these areas to be cleared brings two huge losses to the country. The first is the loss of ecosystem services linked to the water cycle, carbon sequestration, and biodiversity. The second is complacency about illegal and violent methods of appropriating public lands that fuel a chain of crime that is destructive to democracy. As seen in the previous topic, Conservation Units are the safest way to guarantee the constructive functions' performance that the Amazon has to offer the Country.

### 58.

However, the Conservation Units and the populations that depend on them are under attack. About 2.5 million hectares were deforested within the Amazon's Conservation Units until 2013. Pushes to "extinguish" Conservation Units often reach their goals: between 1995 and 2012 a total of 2.8 million hectares lost their status as protected areas, consummating irregular occupations. According to the ICMBio<sup>12</sup>, these irregular occupations in the Amazon reach three million hectares<sup>57</sup>.

### 59.

At the state level, the initiative of the Legislative Assembly of Rondônia stands up in order to cancel the status of several Conservation Units in the State<sup>58</sup>. In these areas, there are 600 thousand hectares, where important rivers with rich flora and fauna are born. These areas had been delimited by the *Zoneamento Socioeconômico e Ecológico do Estado* (State Socioeconomic and Ecological Zoning Commission), approved in 2000<sup>59</sup>.

### 60.

Deforestation is not only an environmental, economic, or social issue. What is at stake in its permanence is a central issue for democracy itself: the strength of republican institutions in making citizens comply with the laws and this compliance is a determinant of their prosperity. The overwhelming majority of deforestation is now practiced illegally and relies on methods that disregard basic standards of coexistence in a democratic society. Since 2012, the State of Mato Grosso has deforested more than 1,000 square kilometers per year. As shown by the follow-up of the Instituto Centro de Vida<sup>60</sup>, based on information from the Mato Grosso Department of the Environment, only 10% of deforestation was legally carried out between January and September of 2017. According to legislation, the result is slightly better than that of 2016, when 5% of deforestation was supported by official permits. IMAZON estimates that, of all deforestation in the Amazon, the total of what was legally authorized does not even reach 20%.

12 | TN: The Chico Mendes Institute for Biodiversity Conservation is the Brazilian Ministry of the Environment's administrative arm.

## 61.

Illegality is also seen in logging data, threats to what should be preserved areas, and most of deforestation in private areas. Although, both protected areas, and those in the hands of the private sector or whose legal status is indefinite are marked by illegal practices that challenge this democratic conquest of contemporary Brazil. As shown by the Instituto Centro de Vida report, the Brazilian Amazon is marked by a “high level of illegality in logging”<sup>61</sup>. A total of 41% of the entire area planted for logging purposes in Mato Grosso between 2013 and 2016 did not receive authorization. Of this total, 66% corresponds to private rural properties, and another 24% are areas with no defined land category, which illustrates the aggression to which these areas without definition are subject, as pointed out above in paragraphs 23 and 24. This proportion of illegality “proves that the current forest monitoring and control systems do not allow the guarantee of the wood’s legal origin.” The ICV continues, “timber products from illegal logging continue to be covered by legal documents, creating a situation of false legality.” The data on Pará shows a proportion of illegal logging activities similar to that of Mato Grosso.

## 62.

Interests in illegal logging end up generating attacks against local communities, as documented by recent Greenpeace work<sup>62</sup>, reporting on what the *Ministério Público do Estado do Mato Grosso* (Mato Grosso Public Prosecutor’s Office) called the Colniza massacre, in which a group of hooded criminals, shot nine people who resisted their ambition to take over existing resources in Taquaruçú do Norte. This included high-value species such as Ipê, Jatobá, and Massaranduba, widely used in the manufacture of furniture and garden decks. “The tolerance and complicity with a crime, by public and private institutions, is shown by the fact that the leading company accused of a crime and fleeing justice is functioning normally and exporting wood abroad<sup>63</sup>.

## 63.

Public works also drive illegal logging attracting large numbers of people. Field monitoring and secondary data monitoring on the impacts of Belo Monte Hydropower Plant, performed by the Instituto Socioambiental<sup>64</sup>, provide important information in this regard: “The demand for the plant itself, as well as the ventures associated with its speculative bubble (mainly in the real estate market), has triggered the logging. To aggravate this scenario, the timber depletion in the unprotected areas and the contextual absolute misgovernment of Pará state’s economic branch to complete the equation: illegal logging in the region under the influence of Belo Monte HPP rose from 20 to 70 thousand hectares just between 2011 and 2012... “. Since the results of this predatory logging need to be transported, ISA has discovered the existence of 760 kilometers of illegal roads in the Indigenous Land of Cachoeira Seca alone.

## 64.

The two tables below, taken from ISA’s work, show the intensity of deforestation and illegal logging activities in one of the Amazon’s most important protected areas, Terra do Meio, in the corridor of Xingu’s socio-environmental diversity, one of the largest protected areas on the planet.

## Deforestation in Terra do Meio's protected areas between 2004 and 2014 (km<sup>2</sup>)

Protected area	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2014*
Triunfo do Xingu EPA (Environmental Protection Area)	412.4	433.3	319.9	453.4	261.8	204.9	163.9	84.8	72.6	85.2	121.4	210.5
ESEC (Ecological Station) of Terra do Meio	155.8	60.7	21.5	27.4	5.6	2.9	5.7	1.2	4.1	0.6	1.3	3.0
Irirí State Forest	7.5	9.6	0.4	0.8	8.1	4.2	1.3	0.9	2.2	1.2	0.0	0.0
Serra do Pardo National Park (Parna)	97.7	15.4	7.5	8.0	1.7	1.4	1.6	0.4	0.2	0.0	0.0	0.3
Rio Iriri Extractive Reserve (Resex)	5.6	3.1	6.7	0.8	8.1	0.8	-	-	0.2	0.1	0.3	0.2
Rio Xingu Extractive Reserve	13.1	1.9	6.4	6.4	0.9	0	0.7	0.1	0.4	0.1	0.1	0.4
Riozinho do Anfrísio Extractive Reserve	8.2	0.5	0.9	1.2	1.8	3.6	1.0	1.0	1.6	0.2	2.2	1.5
Cachoeira Seca do Iriri Indigenous Land (IL)	30.6	35.5	21.4	49.8	45.0	20.0	28.6	19.2	14.7	16.2	6.0	11.2
Kuruáya IL	-	-	-	-	-	-	-	-	-	0.1	0.0	0.1
Xipaya IL	0.1	-	-	-	-	-	0.1	-	-	-	0.0	0.0
<b>Terra do Meio Total</b>	<b>731.1</b>	<b>560.0</b>	<b>384.7</b>	<b>547.8</b>	<b>330.5</b>	<b>237.7</b>	<b>202.9</b>	<b>107.6</b>	<b>95.9</b>	<b>103.6</b>	<b>131.3</b>	<b>227.2</b>
<b>Increment</b>		<b>-23%</b>	<b>-31%</b>	<b>42%</b>	<b>-40%</b>	<b>-28%</b>	<b>-15%</b>	<b>-47%</b>	<b>-11%</b>	<b>8%</b>	<b>27%</b>	<b>119%</b>

Created by ISA's Geoprocessing Laboratory/Altamira, images from Prodes/2014 with refinement at 15 meters.

## Active Roads in the Terra do Meio mosaic between 2005 and 2014 (km<sup>2</sup>)

Created by: ISA's Geoprocessing Laboratory/Altamira. Imazom and ISA data from 2011.

Protected area	2005	2011	2012	2013	2014
Triunfo do Xingu EPA	4153	2527	25267	2527	2676
Terra do Meio ESEC	2007	338	338	338	375
Irirí State Forest	82	14	14	14	53
Serra do Pardo National Park	479	15	15	15	15
Rio Iriri Extractive Reserve	127	14	14	14	14
Rio Xingu Extractive Reserve	134	0	0	0	0
Riozinho do Anfrísio Extractive Reserve	210	345	473	506	546
Cachoeira Seca IL	398	467	542	542	761
Kuruáya IL	54	9	9	9	9
Xipaya IL	13	0	0	0	0
<b>General Total</b>	<b>7656</b>	<b>3730</b>	<b>3932</b>	<b>3965</b>	<b>4450</b>

## 65.

The Brazilian agricultural frontier's expansion is due to patrimonial strategies supported much more by the strength of its protagonists (who often become local, state, and sometimes

leading national policies, as shown in the reports in Torres', Doblas', and Alarcom's book, 2017) than in internationally recognized policies and that Brazil has the technological conditions to apply, such as "soil capacity assessment" and "integrated land use planning" (FAO/UN, 2017: xi).

## 66.

The link between deforestation and crime is an attack on citizenship, human rights, and State power. This link is one of the reasons why, in the Amazon, the municipalities with the most deforestation are the same ones with the greatest explosion of violence, as shown by IPEA<sup>65</sup>. IBAMA's building and equipment fire in Humaitá, Pará, in 2017, is a demonstration of the state's lack of authority in protecting the country's socio-environmental patrimony. Land grabbing, protected area invasion, clandestine road construction aimed at illegal and predatory logging, and vegetation suppression in violation of current legislation<sup>66</sup>, have all been in practice since the 19th century. Moreover, it is obvious that being in practice is incompatible with the 21st century's economic life, with Brazilian agriculture's technical capacity and with the contribution that the country can and should give to the fight against climate change.

## 67.

The ICV<sup>67</sup> survey shows that forest clearing is not dispersed in the State of Mato Grosso, but concentrated: 48% of the cleared areas are in ten municipalities. This finding is a strong indication of criminal action that organizes logistics and takes charge of the violence which is so often associated with illegal deforestation.

## 68.

In addition to timber and the opening of lands for patrimonial objectives, clandestine mining is also a source of deforestation, as reported by Fabiano Maisonnave<sup>68</sup>, in the Tapajós river basin, where the Munduruku Indians organized a war expedition to expel those who invaded their lands. The images from Fabiano Maisonnave's reports in *Folha de São Paulo* and *The Guardian* show the impressive quantity and size of the machines used for gold exploitation, which include airplanes as part of the operational logistics. The conclusion is that this is not a barely visible exploitation or carried on by small isolated

criminals. The dimension of the crimes can be seen by their effects on the water's quality and even its color are impressive. "Today, the economy of many cities depends on environmentally damaging and criminal activities that capture local politicians and gain local acceptance," reports Fabiano Maisonnave. Itaituba, a city of 90 thousand inhabitants, elected a former gold miner as mayor. The city even has a "gold street," where the precious metal is sold openly, despite its illegal origin... When illegal miners burned Federal Government environmental agencies' offices in 2017, governor Amazonino Mendes declared himself on the side of the miners."<sup>69</sup>

## 69.

The legal protection of Conservation Units does not translate into structures capable of being respected. In this sense the data is shocking. The courts' Surveys of the Union's and the States' accounts found that, in 2013, only 4% of these Units had the necessary resources, instruments, and infrastructure to manage themselves<sup>70</sup>. At the beginning of the second decade of the millennium, half of the Amazon's Conservation Units did not have an approved management plan or management council. The number of employees allocated to these Units is meager: one person per 1,871 km<sup>2</sup>, according to IMAZON and ISA<sup>71</sup>. Rodrigo Medeiros and Carlos Eduardo Young show that although Brazil has the fourth largest protected area in the world (behind the United States, Russia, and China), its investments in maintaining the integrity of these territories are far below what is necessary, and not only what is spent by developed countries, but even by developing nations. For every hectare of the protected area, Brazil spends almost five times less than Argentina, seven times less than Costa Rica, nine times less than Mexico, and thirty-five times less than the United States<sup>72</sup>. Also, Brazil's protected area per employee is among the largest in the world: in South Africa, the area is 1,176 hectares per employee. In Brazil, it is twenty times greater<sup>73</sup>.

## 70.

One of the Conservation Units' operational problems is the frequency of their invasions, which contributes to their land regulating difficulty. On the one hand, it is important to consider that many times these invasions are due to bad faith, that is, knowing that it is a Conservation Unit and the expectation that the occupation will be legalized, which is contrary to most of the country's courts' decisions. Even in the case of old occupations and whose compensation is necessary, the investments for this are largely insufficient, which perpetuates the legal uncertainty in these areas. The ICMBio estimates that 5.4 million hectares of Conservation Units are under irregular occupation in Brazil. It would take 7.1 billion BRL to compensate and remove the occupants. At the same time, the TCU estimates that, at the current pace of investments in this direction, it would take one hundred years to complete the land regularization of Conservation Units<sup>74</sup>.

## 71.

Jair Schmitt's doctoral thesis shows that one of the most robust explanations for deforestation is that "the economic advantage to be gained [is] greater than the risks of punishment and production costs of the offense." It shows that "45% of the Amazon's deforestation is not detected in a timely enough manner for surveillance agents to act, and there is state punishment in only 24% of cases." Of this total, "26% of the administrative processes were tried in the first instance, taking on average almost three years". Of all of the fines applied, only 0.2% were paid. The property itself involved in environmental infractions is in possession of the violator, as a custodian.

## 72.

Jair Schmitt developed a model that allowed him to compare illegal deforestation's financial risks with its advantages. What he calls a "dissuasion value" amounts to 38.54 BRL due to an economic advantage (mainly related to livestock) of 3,000.00 BRL per hectare. When deforestation turns to agriculture (agricultural motivation) the potential benefit rises to 5500.00 BRL. Moreover, in the illegal deforestation aimed at the sale of land (land motivation), the monetary estimate risk rises to 77.08 BRL, against an expected gain of 6,000.00 BRL. The author's conclusion is fundamental: "there is a great possibility of gains from illegal deforestation given the low risk of punishment provided by the environmental agency" (170). Whatever the activity (livestock, agriculture, or land), the "specific dissuasion value did not supplant the economic advantage that motivates deforestation" (171). It is for no other reason that the title of Jair Schmitt's thesis is "Unpunished Crime".

## 73.

In summary, although the Amazon's protected areas are an immense asset for the regional development, and Brazil's affirmation as a global environmental power, this patrimony is under attack not only in an episodic way, but also through coordination involving miners, land grabbers, illegal loggers, often backed by local, state, municipal personalities, and political organizations. These attacks are contrary to what the countries that have developed the most in the world do and that, systematically, preserve and value their forest areas, as will be seen below.



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## – Forest protection is not a Brazilian idiosyncrasy

### 74.

Contrary to a widely held belief, the basis of economic growth in the world's richest countries is not deforestation. It is true that, until the nineteenth century, deforestation was much more important in temperate regions than in the tropics, as shown by the State of the World Forest FAO/UN<sup>75</sup>. However, this does not make tropical forest destruction permissible in the middle of the 21st century, under the pretext that “the rich countries also practiced this destruction.” The developed countries’ forest-based destruction, rightly reflected the precariousness, in the past, of their economic growth conditions. As soon as these countries had the minimum

technical conditions to increase agricultural productivity, deforestation was significantly reversed as a result of both increased productivity and rural exodus.

### 75.

Technological improvements in forestry for the supply of wood and its industrial base have allowed only 7% of the global forest area to provide more than half of the wood consumed in the world, which should increase to 80% in the next twelve years<sup>76</sup>. The Brazilian contribution in this direction is fundamental: the country is at the forefront of technological innovation in the production of paper and pulp.

## 76.

After the 19th century, there were already significant examples of countries that have included forest recovery not only in their national objectives but in their legislation. This change in attitude, culture, politics, and practice in the relationship between societies and forests results from many factors but is based on the possibility of intensifying agricultural and livestock production, using less and less land. In addition, both the scientific knowledge and the practical experience of the farmers paved the way for the “forest transition,” in which lands less suitable for agriculture are no longer devoted to production and return to the forest condition, either by natural regeneration or by reforestation, as shown by the State of the World Forests FAO/UN<sup>77</sup>.

## 77.

This was the case, at different historical periods, in Northern Europe, the United States, but more recently in China, India, and Vietnam. This is what the experts call the Borlaug hypothesis: increasing productivity in agriculture reduces the pressure to convert forest areas to agricultural land. However, it was important in the process of forest recovery that marks several countries in the world the view that much more than the conflict between the two types of area, well-managed forests have immense potential to improve the performance of agriculture itself. At the same time, dynamic, productive agriculture capable of incorporating land-saving technologies opens the way to desired deforestation reduction.

## 78.

In this sense, it is important to emphasize two different models in the relation established between the portion of the landscape dedicated to agricultural production and that destined for the conservation of natural resources, ecosystem services, and biodiversity. These are called land-sharing and land-sparing strategies. In the

first, productive areas interact closely with protected areas favoring the exchange of energy and biomass flows, with extensive land use, while in the second, intensive production and land-saving zones are formed for full environmental protection. The extensive and traditional breeding of beef cattle in the Pantanal and the reforestation plots of pine and eucalyptus, interspersed by native forests arranged in legal reserves, are mentioned respectively. On the other hand, neither extensive livestock nor intensive soybeans can now be cited as examples of such strategies in the Amazon. Extensive burn-based livestock breeding does not even respect the carrying capacity of exotic pastures, and the giant pockets of soybeans completely isolate the forest fragments, making the landscape matrix virtually insurmountable to most of the fauna<sup>78</sup>.

## 79.

Thiago Fonseca Morello (2011) has gathered an extensive bibliography showing that since the 19th century, France, Denmark, Sweden, and Scotland have started to promote the growth of their forest areas. Moreover, it is important to remember that both Denmark and especially France, are countries where agriculture plays a key role in economic growth. France's forest area doubled between the end of the 19th and the end of the 20th century. One-third of the country is occupied by forests, many of which are in private hands. Moreover, of the 16.5 million hectares of forest, only 2 million correspond to industrial interest plantations, mostly resin<sup>79</sup>. The great majority is intended to preserve ecosystem services essential to the economy and society. In the first half of the twentieth century, the United States, Germany, England, and Ireland also pursued policies to expand their forest areas.

## 80.

The evidence shown in the Technical Note prepared by Adalberto Veríssimo (from IMAZON) and Ruth Nussbaum (from PROFOREST, University of Oxford)<sup>80</sup> goes in the same direction. Also, the work shows that the assertion that Brazilian legislation imposes

COUNTRY	FOREST LEGAL FRAMEWORK
<b>Germany</b>	In general, forest areas cannot be converted to other land uses, and where it occurs, it is necessary to obtain permission from competent government authorities. Wood exploration is allowed, but with forest recomposition and forest management.
<b>China</b>	In general, Chinese forest law states that forests should not be made available for mining or infrastructure projects. If such activities are necessary, those who wish to perform forest clearing must obtain approval and must pay a forest restoration fee.
<b>United States</b>	At the federal level, the conversion of intact areas of Natural Forests is prohibited by the National Forests Roadless Area Conservation Act <sup>12</sup> . Private land forest management is generally controlled at the state level and varies among US states.
<b>France</b>	Conversion of an area of more than 4 hectares requires government permission, which will only be granted for environmental reasons.
<b>India</b>	In India, almost all forest areas are state-owned. Forestry law requires ownership maintains the land as a forest. The government also has the right to prevent private forest owners from converting forests to other uses.
<b>Indonesia</b>	Almost all forest areas are state-owned. There is a significant area of forest designated for legal conversion. However, a recent presidential decree puts a moratorium on issuing new deforestation until a new land use plan is defined.
<b>Japan</b>	The Japanese Forest Code does not permit forest conversion of both state and private forests, except in extraordinary circumstances.
<b>Poland</b>	Forest owners are required to manage their forests according to a forest management plan. Logging is permitted, but forests must be regenerated, and their conversion is generally not permitted.
<b>United Kingdom</b>	The conversion of forest to agriculture is not permitted except in extraordinary circumstances. Its conversion to infrastructure is only allowed when proven that there is no reasonable alternative.
<b>Sweden</b>	Forest owners are required to manage their forests actively, converting the forest to other uses permitted in exceptional circumstances only.

unreasonable demands on farmers not practiced in other countries is not true, as can be seen in the table below.

## 81.

It is important to note that, in China's case they do not compare themselves internationally. The table above (with the forest coverage of several countries since 1900) shows that at the beginning of the Revolution of 1949, China's forest area had been reduced to between 5% and 9% of the country's total area. At the beginning of the second decade of the 21st century, 22% of Chinese territory was covered

by forests. Fernando Reinach's column<sup>81</sup>, based in an article in Nature Sustainability<sup>82</sup>, shows that between 1999 and 2013, China reforested the most devastated 280 million hectares in its Southwest region. This corresponds to the State of São Paulo's entire surface area. The comparison of Fernando Reinach is fundamental: "Just remember that all soybeans in Brazil occupy 33 million hectares, sugarcane, 9 million and eucalyptus forests, 4.8 million hectares. In terms of deforestation, Brazil loses approximately 500 thousand hectares of Amazon Forest per year. That is, in four years China planted the equivalent of 56 years of Amazonian deforestation!"



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## – CONCLUSIONS: moving toward the knowledge economy based on nature

### 82.

Climate change is recognized by almost all the scientists who publish in the most prestigious journals in the world as the most critical challenge that humanity has ever faced. Combating it, or at least mitigating it, implies profound transformations in the contemporary models of production and consumption. These transformations, in turn, rely not only on a great deal of science and technology but also on the urgency of modifying the fundamental dimensions of social behavior, as shown by the United Nations-approved Sustainable Development Goals endorsed by Brazil.

### 83.

Brazil has a two-fold and fundamental global contribution in the fight against climate change. The first is to be able to stop deforestation immediately. This study gathered evidence showing that this interruption does not suppose complex technological achievements or sacrifices in the well-being of the Country or the Amazon itself. Countries such as China or the United States face complex scientific and technological challenges to decarbonize their energy, transportation, or home heating matrices. In our case, the primary source of GHG continues to be deforestation, which in

order to be stopped does not imply disruptive changes in the production and consumption patterns of the economy as a whole. To continue as the only country in the world (along with Indonesia) that is on the list of major emitters because of deforestation does not live up to Brazil's position as a global environmental power. It is a sign of regression with which a modern society cannot live.

## 84.

The second overall country contribution (and particularly of the Amazon) against climate change is the emergence of a nature-based knowledge economy. Bearer of the planet's most exceptional biodiversity, the country must prepare to transform this enormous wealth into a source of development. This contribution assumes three basic conditions.

## 85.

The first is, of course, to avoid the destruction of the area that concentrates the planet's most exceptional biodiversity. This report showed that the deforestation carried out so far has opened areas large enough to allow the expansion of agriculture in the Amazon. The vast majority of this area is underutilized and persisting in destruction responds not to rationally justifiable economic needs but to patrimonial strategies of criminals who base their ambitions on illegality and violation of the constitutive rights of republican life. Investing in Conservation Units is a strategy for Brazil to provide Brazilians, and the world, with ecosystem services that are fundamental to life on the Planet. To tolerate the invasion and reduction of their areas is to renounce a global role that will become increasingly important for Brazil.

## 86.

The second condition for making forest maintenance a baseline for the fight against climate change, and sustainable development, is to recognize traditional populations'

strategic role and their activities in the occupation of these areas. Both the forest, and the traditional populations that inhabit it, represent not only economic or ecosystem utility, but a cultural richness that expresses itself in the diversity of the languages of customs and the very material culture of the forest peoples. Brazil's responsibility is immense in preserving this unique source of diversity, teachings, and wisdom. This is a civilizational and ethical value that Brazil must see as an asset, and not as an obstacle to its growth.

## 87.

The third condition for transforming the forest into a base for sustainable development lies in the transition from what has, hitherto, been an economy of the destruction of nature to a nature-based knowledge economy. Carlos Nobre et al.<sup>83</sup> shows the urgency of the devices of the so-called fourth industrial revolution be applied to knowledge and the exploitation of the Amazon. A territory holder containing the greatest biodiversity of the planet, it is fundamental that the country should equip itself with the means to understand this immense wealth scientifically, and thus to be able to explore it sustainably. This presupposes the presence of research centers and the strengthening of university structures in the Amazon as a whole, as the fundamental document of the Academia Brasileira de Ciências<sup>84</sup> (Brazilian Academy of Sciences) recommended ten years ago.

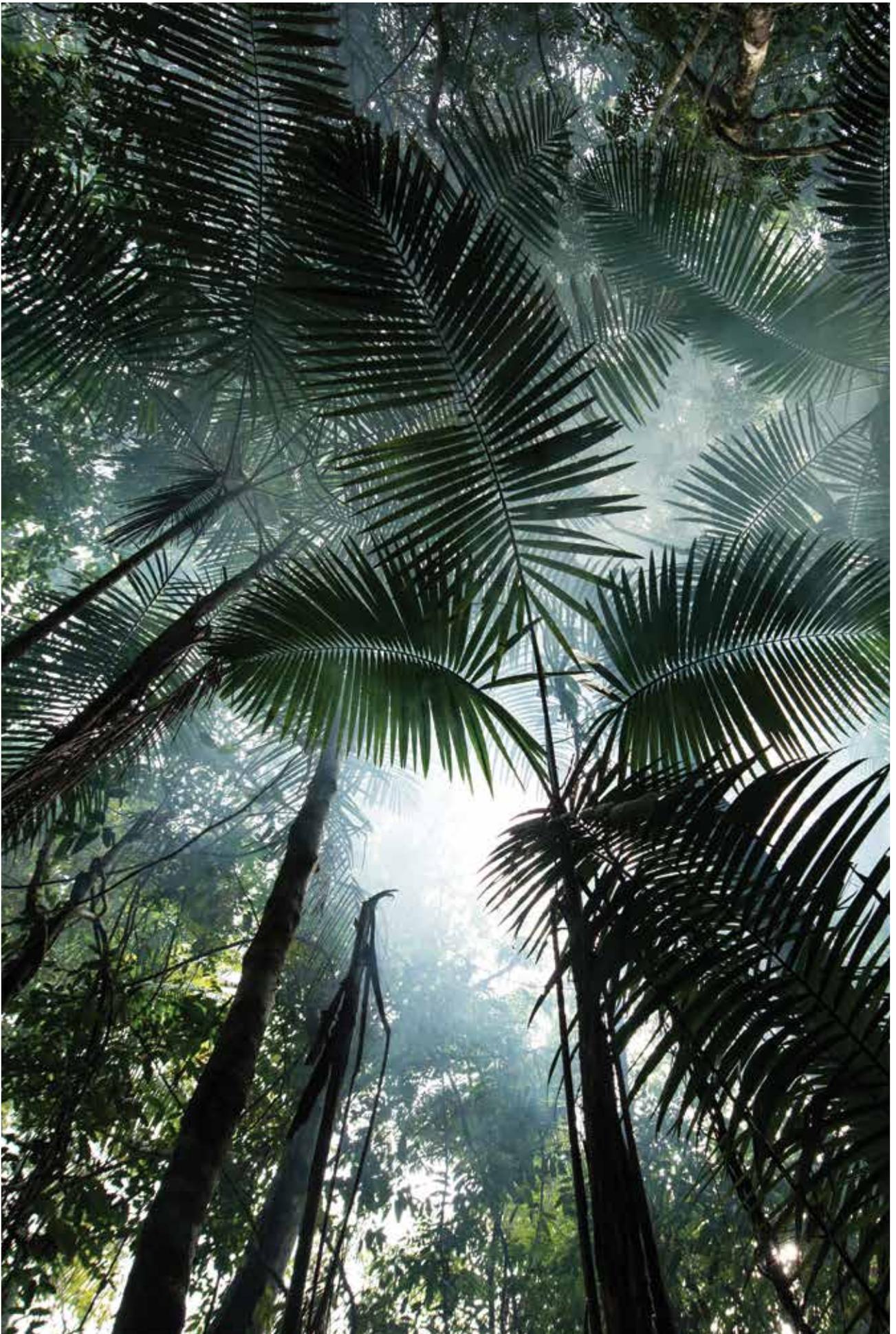
## 88.

Tolerating deforestation, the overwhelming majority of which is illegal and with which the agribusiness industry itself no longer agrees to live (as the soybean moratorium shows), is to compensate for the regression, violence, and weakening of democratic institutions, whose operation should lead to public and private investments in the strengthening of protected areas and the innumerable activities that allow the well-being of the populations that live there.

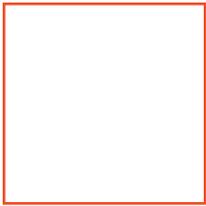
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