ALLIANCE
FOR RESTORATION IN THE
AMAZON

FOREST LANDSCAPE RESTORATION IN THE AMAZON
OVERVIEW AND PATHS TO FOLLOW

POSITION PAPER

FOREST IS SYNONYM OF WEALTH, ABUNDANCE AND PROSPERITY

IN THE AMAZON, THE FOREST ENSURES WATER SECURITY, BIODIVERSITY AND QUALITY OF LIFE. UNDERSTANDING THIS IS FUNDAMENTAL FOR THE STRENGTHENING OF SUSTAINABLE PRODUCTION CHAINS AND THE PROMOTION OF HUMAN AND ECONOMIC DEVELOPMENT IN THE REGION THROUGH FOREST CONSERVATION, MANAGEMENT AND RESTORATION - AGENDAS THAT MUST BE INTEGRATED INTO MULTISECTORAL POLICIES AND ACTIONS. THIS IS THE VISION OF THE ALLIANCE FOR RESTORATION IN THE AMAZON, AN INTERINSTITUTIONAL AND MULTISECTORAL COALITION ESTABLISHED IN 2017 WITH THE MAIN GOAL OF PROMOTING, QUALIFYING AND EXPANDING THE SCALE OF FOREST LANDSCAPE RESTORATION IN THE AMAZON. [I]

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PRESENTATION

The United Nations (UN) Decade on Ecosystem Restoration (2021-2030) is a unique opportunity for humanity to face climate change and conserve the planet's biodiversity and water. [II] In addition to being an environmental and climate agenda, restoration is also a human development agenda and contributes to all Sustainable Development Goals (SDGs). [III] This will be even more relevant in the post-Covid-19 scenario, where ensuring social welfare and the resumption of economic activities will depend on more inclusive strategies, capable of reconciling national priorities with the main global challenges, such as the climate crisis and the loss and fragmentation of natural ecosystems, both directly related to the emergence of new diseases. [IV]

Forest conservation and restoration in the Amazon has a strategic role in this scenario. However, Brazil is going in the opposite direction and the rate of burning, forest degradation and deforestation in the Amazon region is extremely high – something that has contributed to the country's negative image internationally. Companies and banks have taken position on this and committed themselves against illegal deforestation in the Amazon. However, Brazil needs more ambitious commitments on the part of the government and the private sector, such as the implementation of the Law on the Protection of Native Vegetation (Law 12,651/2012) – known as the new Forest Code, which provides for the restoration of the environmental liabilities. In addition to the legal obligations, forest restoration can and must become an attractive economic option for rural producers and investors.

The sustainable economic use of native and restored forests is an opportunity for the development of technological innovations and production chains capable of attracting private capital and strengthening the region's industry, generating jobs and income without clear-cutting and degrading forests. To promote forest restoration in the biome, the **Alliance for Restoration in the Amazon** carried out a diagnosis of the current situation concerning forest landscape restoration in the Brazilian Amazon and proposes guidelines to increase its success, scale and integration with other sectors of society.

MAIN MESSAGES

- Illegal deforestation, forest degradation and fires generate climatic, environmental, socio-cultural and economic damage – an irreparable damage to the national heritage that impacts the entire society and prevents Brazil's compliance with its own laws and international agreements.

- Forest landscape restoration is a means of re-establishing the ecological functions of the forest and the productivity of the land, expanding the offer of forest products – both timber and non-timber – and of environmental services, and conserving biodiversity, generating work, income and promoting well-being. In the post-Covid-19 scenario, its importance is even greater.

- There are different strategies with different costs and benefits for promoting the restoration of forest landscapes. Regardless of the method, it is necessary to ensure the protection of the area against fire and other degrading factors. Monitoring restoration is also critical to its success.

- The **Alliance for Restoration in the Amazon** identified 2,773 forest restoration initiatives in the Brazilian Amazon, totaling 113,500 hectares. Productive restoration through Agroforestry Systems (AFS) accounts for most initiatives (59%), but ecological restoration with planting of seedlings represents 59% of the area under restoration. Civil society organizations are responsible for most initiatives (2,426), while companies account for 52% of the total area under restoration. Most of the initiatives (79%) are small-scale (areas smaller than 5 hectares).

- AFS represent an excellent strategy to integrate production, conservation and restoration. There are several models and arrangements, adapted to different stakeholders, scales and interests, but financial support depends on well-integrated productive arrangements.

- **Ten recommendations** are presented to qualify and expand the restoration scale, based on a positive agenda focused on compliance with legislation, development of sustainable production chains and engagement of all sectors. To meet these recommendations, the different sectors will need to face the following challenges:

    1. **Government sector**: Restrain illicit activities through command and control. Implement laws and policies already approved – as well as their instruments – related to restoration, environmental regularization, payments for environmental services and the bioeconomy. Award fiscal and tax exemptions to certain links in the restoration chain. Foster new business opportunities;

    2. **Private sector**: Ensure compliance with Brazilian laws throughout its production and/or relationship chain. Take an active role in promoting a low carbon regenerative economy and increasing investment in restoration;

    3. **Financial sector**: Facilitate access to and improve the operationalization of lines of credit. Promote a new forest and agroforestry economy. Educate banks to consider the restoration agenda as strategic for business. Ensure that investments and credit are granted only to people, companies and organizations that comply with the laws;

    4. **Educational, research and extension institutions**: Increase investments and develop actions to fill knowledge gaps about the different restoration methods in the biome (monitoring included) and educate about low-cost technologies to increase the scale of restoration;

    5. **Civil society**: Promote broad social participation, create spaces for dialogue and cooperation between sectors, educate about good practices, support the design and implementation of public policies in addition to the mobilization and raising of funds for the implementation of restoration.

THREATENED HERITAGE

Illegal deforestation, forest degradation and fires in the Amazon are the main causes of biodiversity loss and CO_2 emissions of Brazil. Although there are farmers committed to more efficient agricultural practices, the expansion of the agricultural frontier in the region continues to be characterized by low productivity and associated to deforestation, land speculation and illegal activities. Almost 20% of the original forest cover in the Amazon has already been deforested (80.3 million hectares, Figure 1). It is estimated that the degradation of forests by fire and logging has reached an extent equal to or greater than the deforested area.[V] In 2019, more than 1 million hectares of forests were clear-cut - the highest rate in the last 11 years [VI] and in 2020, in the middle of the Covid-19 pandemic, the pace of destruction was even more accelerated. This level of deforestation is extremely dangerous because it brings the region closer to a tipping point where irreversible changes in the hydrological cycle may occur. [VII] This has direct implications for the social and economic development of the region and of Brazil, since the Amazon influences the rainfall regime in much of the country and the South American continent. [VIII]

FIGURE 1 **DEFORESTATION IN THE BRAZILIAN AMAZON ACCUMULATED UP TO 2019 (INPE, 2019).**
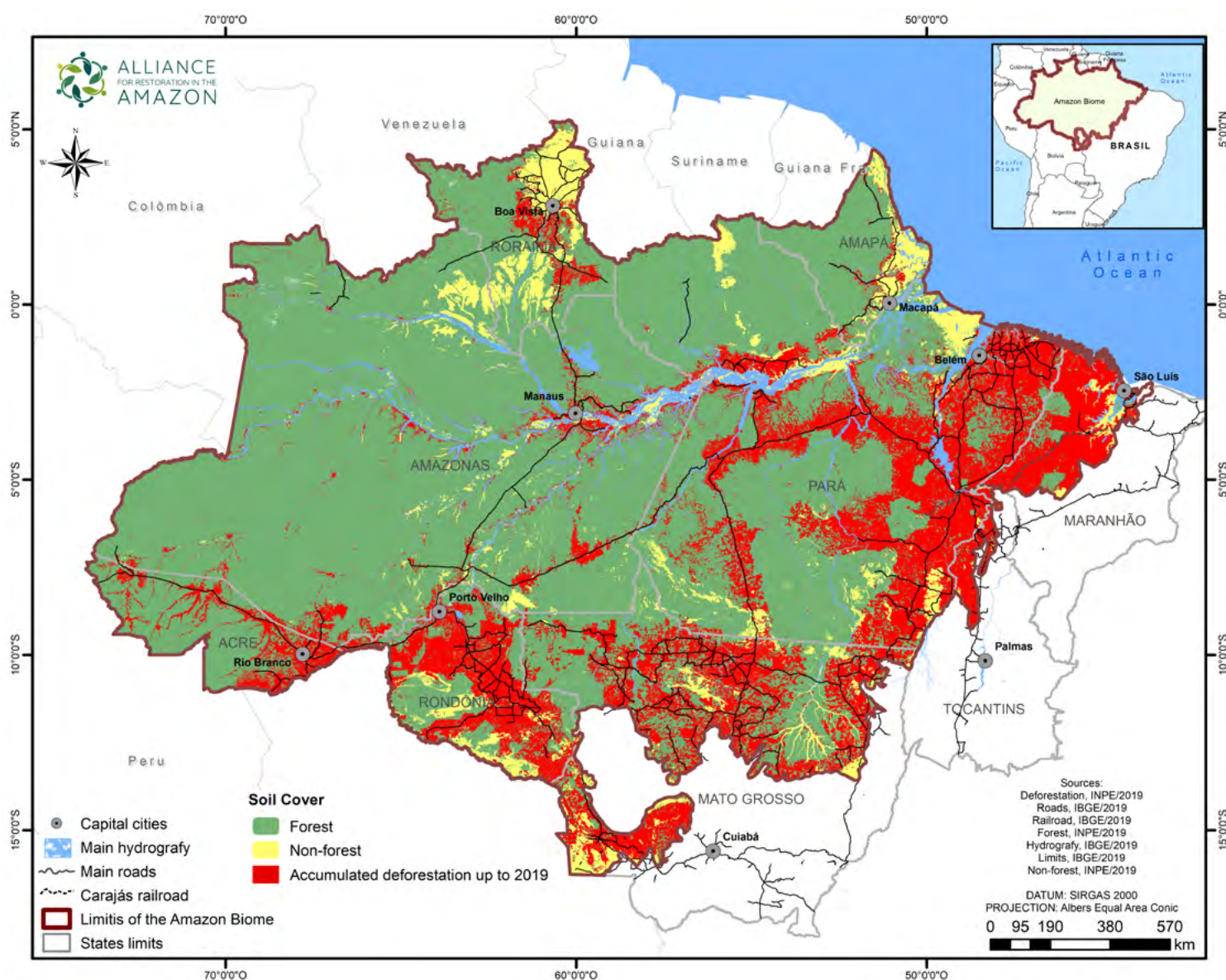
The first step in protecting the Amazon and developing inclusive and sustainable productive chains is to curb the high rates of deforestation and forest degradation. The Brazilian Coalition on Climate, Forests and Agriculture – which includes representatives from agribusinesses, the financial sector, civil society and the academia – listed six actions to reduce deforestation [IX]. There is an urgent need to immediately stop illegal deforestation in the Amazon through command and control actions, such as PPCDAM [X], and of formal commitments by the private sector, in particular agribusinesses. Recently, companies and banks joined the movement against illegal deforestation in the Amazon, with public demonstrations and disclosure of internal sustainability policies. This movement has gained global importance and comes in response to a strong negative impact on the country's international image and the demand of some markets regarding the traceability of the production chains of commodities such as meat and soy.

In addition to environmental and climatic problems, forest degradation and deforestation have generated social liabilities marked by violence against traditional peoples and communities, the use of labor analogous to slavery and the maintenance of social inequalities and high levels of poverty. Today it is known that only 2% of rural properties are responsible for more than 60% of the illegal deforestation in the country [XI], and that abandoned or underutilized agricultural areas in the Amazon total 10 million hectares. [XII] This shows that there is no need for new deforestation to increase production in the region. Investments in research, innovation and technology can guarantee a more efficient use of agricultural areas. It is urgent for public and private entities to undertake a real commitment to comply with the country's environmental legislation, such as the Law on the Protection of Native Vegetation and State and Municipal laws. Eliminating illegal deforestation, curbing the invasion and occupation of Conservation Units, Indigenous Lands and Public Lands for illegal activities protects our natural and cultural heritage and one of our greatest assets: the forest. At the heart of compliance with the law, becoming at the same time a new paradigm for economic development in the Amazon, is **Forest Landscape Restoration**.

Planting of seedlings in an agroforestry collective effort (Ecoporé/ RO)

Ecological monitoring of natural regeneration (UFRA/PA)

Seedling production in a tree nursery (Rio Terra/RO)

Seed mix (Muvuca) for direct sowing (ISA/MT)

FOREST LANDSCAPE RESTORATION

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Forest restoration is one of the most important technologies available to remove carbon dioxide (CO_2) from the atmosphere on a large scale, and it is a strategy to rescue and conserve biodiversity in altered landscapes. Forest restoration optimizes land use and ensures the provision of essential environmental goods and services to maintain the profitability of economic activities and human well-being. For this reason, the Law on the Protection of Native Vegetation establishes that the Permanent Preservation Areas (PPAs) and Legal Reserve areas (LR) deforested in violation of the law must be restored. Forest liabilities in the Amazon are estimated at around 8 million hectares, and at least 5 million hectares should be restored; the difference may be compensated through mechanisms provided for by law. [XIII] The restoration of these liabilities can move us away from the climatic risk of the tipping point and remove CO_2 from the atmosphere, guaranteeing facing climate change and fulfilling the Nationally Determined Contributions (NDC) established by the Paris Agreement. [XIV]

Restoration in the Amazon must prioritize the forest landscape restoration approach that integrates different strategies (Text Box 1). It is a way of restoring the functionality of forest ecosystems and the productivity of the land, as well as expanding the offer of forest products and inputs, generating of work and income and guaranteeing social well-being. Amazon landscapes are composed of rivers, intact forests, transformed forests, agricultural areas and pastures, among other land uses. Each of them can be better integrated to promote landscapes that are more permeable to biodiversity and less susceptible to degradation. Understanding the landscape as a mosaic of different land uses allows to develop interventions that consider not only the ecological system, but also the socioeconomic system, aiming to maximize the benefits and minimize the negative impacts.

By identifying the most suitable areas for agricultural use, efforts and investments can be directed towards the sustainable intensification of production in strategic, more profitable areas, reducing pressure on the native forest. In the same way, by identifying areas of high conservation value and areas with high restoration potential, it is possible to efficiently target efforts and financial resources to reduce the cost of restoration and create opportunities for strengthening local economies. Reconciling different land uses is one of the main challenges to achieve a better use of forest production potential in the Amazon. In addition to the ecological benefits and the sequestration of atmospheric carbon, restoration can foster a sustainable production chain in its various stages. The development of the restoration production chain can significantly contribute to the post-Covid-19 economic recovery proces, as well as to the strengthening and support of traditional communities and populations that depend on forest resources for their well-being.

The sustainable economic use of forests and their restoration is an opportunity for the development of technological innovations and production chains capable of attracting private capital and strengthening the region's industry, without clear-cutting and degrading forests. Many countries are preparing for a green recovery to address the challenges associated with the post-Covid 19 economic recovery. Brazil may take up a position of global leadership in this scenario.

TEXT BOX 1
DEFINITIONS OF RESTORATION AND RELATED TERMS

Forest landscape restoration: the process of restoring ecological functionality and improving human well-being in deforested or degraded forest landscapes (includes several complementary techniques, with ecological and productive purposes);

Ecological restoration: Intentional human intervention in altered or degraded ecosystems to trigger, facilitate or accelerate the natural process of ecological succession and restore the ecological functions of an area;

Natural regeneration: Process by which a population by native species is established without human intervention, through ecological succession;

Assisted natural regeneration: Planned interventions with the aim of guaranteeing and/or optimizing the natural regeneration potential;

Reforestation: Planting of forest species, whether native or not, in pure stands or not, to form a forest structure for economic or ecological purposes;

Agroforestry systems (AFS): Land use and occupation systems managing trees in association with agricultural and/or forage crops;

Tropical forestry: Planting of native tree species for economic purposes;

Vegetation recomposition: A generic term that includes several vegetation restoration actions (ecological restoration, natural regeneration, rehabilitation, AFS, reforestation).

STRATEGIES FOR FOREST LANDSCAPE RESTORATION

There are different forest restoration methods with different costs and benefits. The choice of a method depends on the state of degradation, the desired outcomes and the available financial capital, in addition to the socio-cultural context and the legal framework. From the perspective of restoring forest landscapes, we seek to integrate ecological restoration strategies (natural regeneration, planting of seedlings, seeds, etc.) with productive restoration strategies (agroforestry systems, forestry, among others), to optimize the environmental, social and economic benefits on the landscape scale.

Assisted natural regeneration is a method with great potential to scale up restoration in the Amazon, due to the low cost of inputs and labor. However, to ensure that natural regeneration acts as an ally in the restoration process, it is essential to ensure legal rules and mechanisms for the protection, use and management of these forests undergoing regeneration (also called secondary forests). Without formal conservation commitments, regenerating areas tend to be deforested or burned again. In the Amazon, 14.9 million hectares are covered with secondary vegetation (Figure 2), [XV] but the deforestation in these areas has been on average 40% higher than in primary forests. [XVI] In addition

FIGURE 2 SECONDARY VEGETATION IN THE BRAZILIAN AMAZON IN 2018 (ADAPTED FROM SILVA JR. ET AL, 2020).
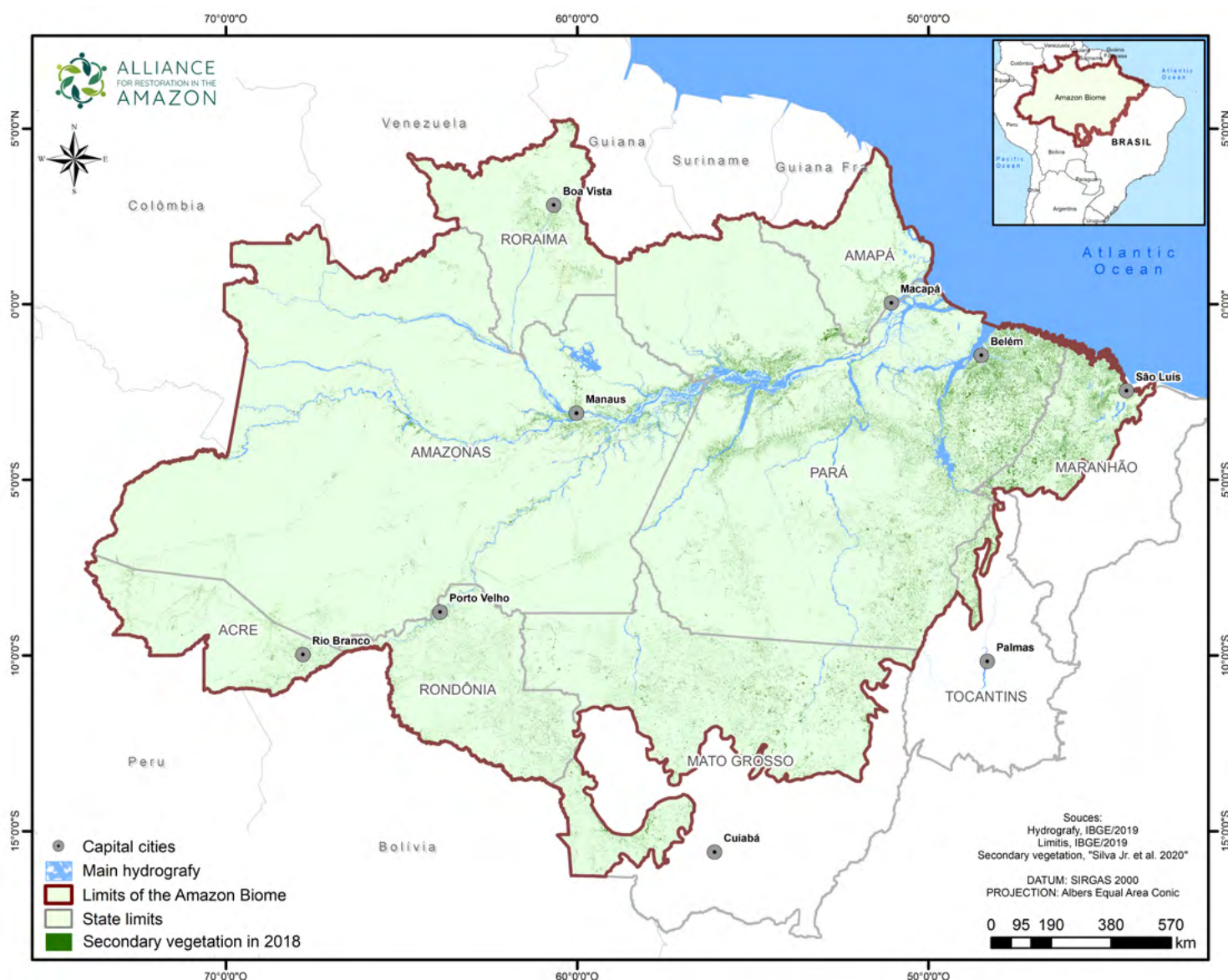
to ensuring protection, it is essential to monitor regeneration to evaluate the ecological quality of these secondary forests and to ensure that, in addition to forest cover, the diversity and functionality of these ecosystems is restored, which does not always happen without active human intervention.

Depending on the degree of alteration or degradation, the potential for natural regeneration is quite variable. In areas where the ecological succession process is already underway, examples of such interventions are facilitation, densification and enrichment methods. These strategies can increase the value of areas undergoing regeneration in terms of services and products. In areas with low potential for natural regeneration, it is usually necessary to carry out active interventions, such as planting seeds and seedlings, which are usually more costly. Direct sowing has become promising, mainly because it has lower costs and less need for inputs than traditional seedlings, like the technique known as 'muvuca'. [XVII] However, planting seedlings is still the most used restoration technique in Brazil. Nucleation (planting of tree islands or other techniques), although not widespread, facilitates the colonization by native species, accelerating the succession process with a good cost-benefit ratio. [XVIII]

In turn, productive forest restoration techniques guarantee a direct economic return along with the reestablishment of ecosystem services, allowing to prevent further degradation, new deforestation and ensuring improvements in the quality of life in this region that ranks among the worst HDIs in Brazil. For this purpose, agroforestry systems (Text Box 2), silvopastoral systems, silviculture with native species and other regenerative and low carbon productive systems must be encouraged. The replacement of conventional low-productivity pastures with silvopastoral systems, where trees and livestock share the same space, decreases soil erosion rates and increases pasture productivity. Non-timber forest products such as açaí palm, andiroba, cocoa, chestnut, coumaru, cupuaçu, peach palm and many others, represent a high-value and still underutilized economic potential.

TEXT BOX 2

AGROFORESTRY SYSTEMS

Highly diverse agroforestry systems (AFS) have been used in the Amazon for thousands of years and there is evidence that they were the basis of subsistence for complex societies that lived in the region 4,500 years ago. [XIX] These production systems are the best strategy to integrate production, conservation and restoration. AFS can be used to restore PPAs (Permanent Preservation Areas) and LR (Legal Reserve areas), and there are several different models and arrangements, adapted to different stakeholders, scales and interests. The use of agricultural and short-cycle species can contribute to food security and income generation in the early years of the system, in addition to covering part of the restoration costs. Consistent productive arrangements should consider the choice of species using socioenvironmental and economic criteria, the connection with other links in the production chains (also at the local scale), agroindustrial structures for processing, and marketing channels. There are many successful cases that show how restoration through AFS can generate work, income and food security, among other direct and indirect benefits. Among them, we highlight:

Projeto Reflorestamento Econômico Consorciado Adensado - RECA (Rondônia): 300 families benefit from 2,500 hectares of AFS which supply a cooperative agroindustry that annually processes over 500 tons of pulp (cupuaçu and açaí palm), 430 tons of nuts and seeds, 72 tons of heart of palm, among other products.

Projeto Cacau Floresta (Pará): 250 families benefit from 500 hectares of productive AFS with cocoa - a product with high value added.

Cooperativa Agrícola Mista de Tomé-Açu – CAMTA (Pará): 172 cooperative members and 1,800 family farmers supply the fruit pulp agroindustry through AFS.

Café Apuí (Amazonas): 59 families produce organic coffee in 33 hectares of AFS, where more than 32 thousand trees were planted. These systems increased the income of the families involved by 300%.

FOREST LANDSCAPE RESTORATION OVERVIEW XX

The Alliance for Restoration in the Amazon identified 2,773 forest restoration initiatives in the Brazilian Amazon, covering an area of 113,500 hectares. The state of Rondônia concentrates the largest number of initiatives (1,658), but accounts for only 9% of the area under restoration. The area under restoration is concentrated mainly in the states of Pará (49% of the total mapped area under restoration) and Mato Grosso (27%) (Figure 3 and Table 1). The largest number of initiatives corresponds to agroforestry systems (AFS) with a total of 1,643 (59%), followed by planting of seedlings with 734 initiatives (26%) and direct seeding (7%). The other methods (natural regeneration, tropical forestry and nucleation) represents less than 5% of the initiatives. In size, however, the planting of seedlings is the technique that covers the largest area, totaling 66,400 hectares (Table 2).

The restoration initiatives identified are developed mainly by civil society organizations (87.5% of the total), companies (5.6%), farmers (3.8%), research institutions (2.4%) and governments (0.7%). However, in terms of the area under restoration, companies account for 52% of the total, followed by research institutions (21%), civil society (20%), governments (4%) and farmers (3%). The vast majority of the identified restoration initiatives (2,193 or 79%) are less than 5 hectares, 13% are between 5 and 49.9 hectares, and only 8% are larger than 50 hectares (Figure 4). This highlights the challenge of scaling up restoration, i.e. of increasing the restored area so that it has a significant impact on the biome. One way of scaling up is to increase integration between initiatives and between different stakeholders and sectors of society.

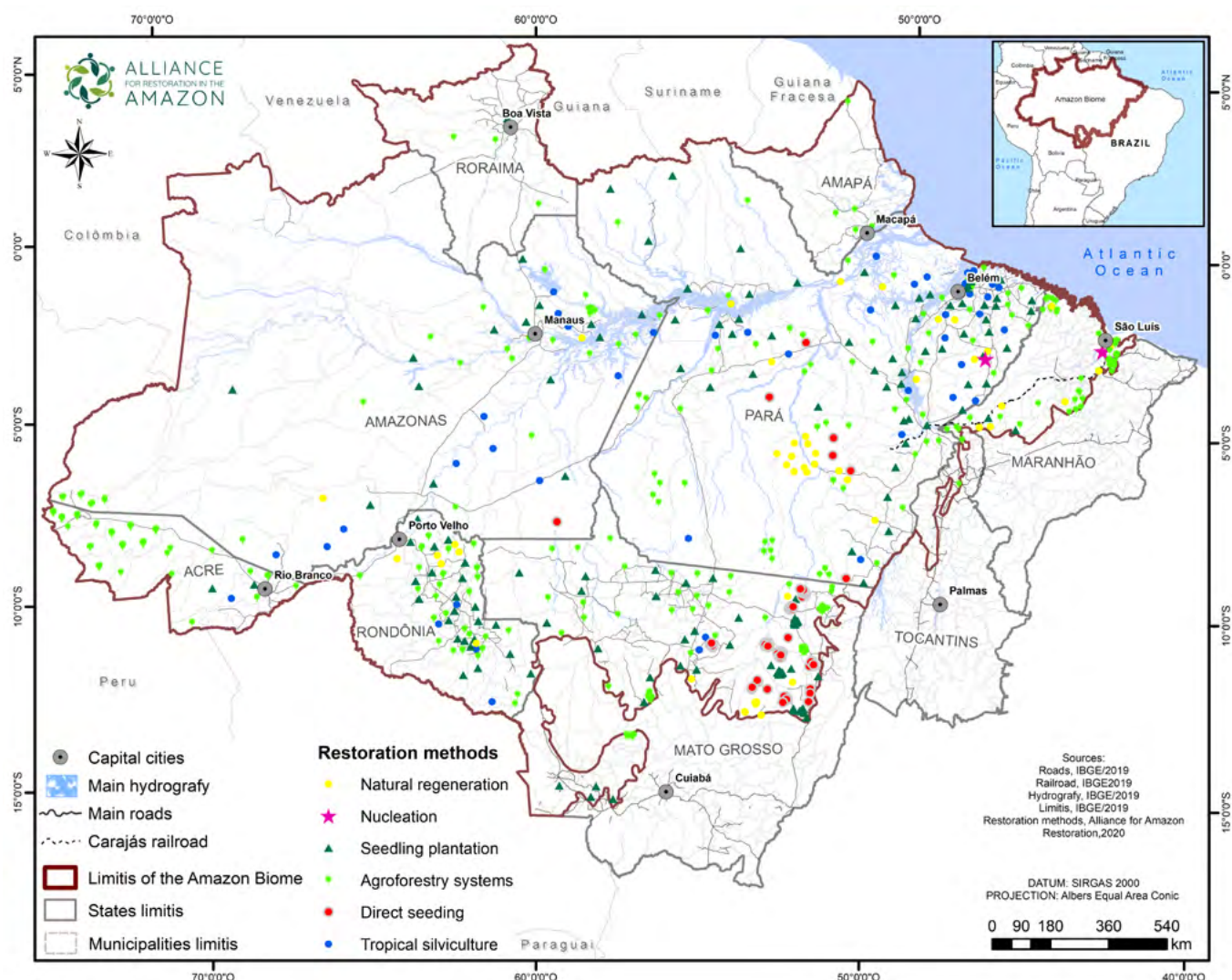**FIGURE 3** **FOREST LANDSCAPE RESTORATION INITIATIVES IN THE BRAZILIAN AMAZON.**

TABLE 1 FOREST LANDSCAPE RESTORATION INITIATIVES BY STATE IN THE BRAZILIAN AMAZON.

STATES	NUMBER OF INITIATIVES		TOTAL AREA (HECTARES)	
ACRE	57	2%	1.108	1%
AMAPÁ	5	0%	61	0%
AMAZONAS	81	3%	14.957	13%
MARANHÃO	72	3%	256	0%
MATO GROSSO	445	16%	30.733	27%
PARÁ	444	16%	55.971	49%
RONDÔNIA	1.658	60%	10.179	9%
RORAIMA	4	0%	84	0%
TOCANTINS	7	0%	171	0%
TOTAL	**2.773**	**100%**	**113.520**	**100%**

TABELA 2 FOREST LANDSCAPE RESTORATION INITIATIVES IN THE BRAZILIAN AMAZON ACCORDING TO THE METHOD USED.

RESTORATION METHOD	NUMBER OF INITIATIVES		TOTAL AREA (HECTARES)	
AGROFORESTRY SYSTEMS	1.643	59%	15.554	14%
PLANTING OF SEEDLINGS*	734	26%	66.425	59%
DIRECT SOWING	185	7%	3.719	3%
ASSISTED NATURAL REGENERATION**	147	5%	13.434	12%
TROPICAL SILVICULTURE	63	2%	14.387	13%
NUCLEATION	1	0%	1	0%
TOTAL	**2.773**	**100%**	**113.520**	**100%**

FIGURE 4 AREA OF THE FOREST LANDSCAPE RESTORATION INITIATIVES IN THE BRAZILIAN AMAZON.

- < 1 hectare
- 1 - 4,9 hectares
- 5 - 49,9 hectares
- > 50 hectares
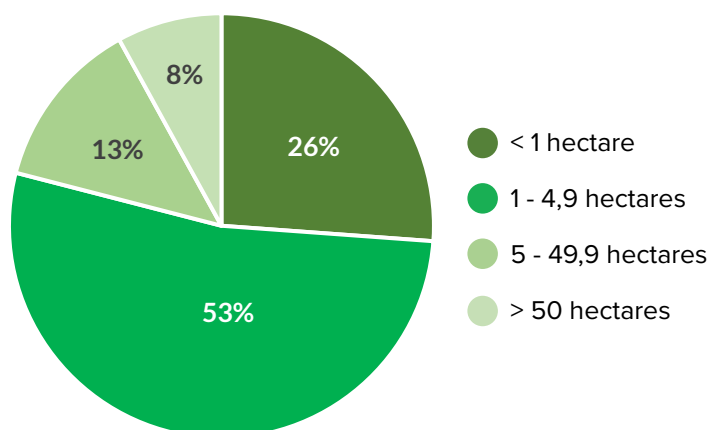
Restoring degraded areas and organizing productive hubs can generate jobs and income for communities and contribute ton the consolidation of a much more sustainable forestbased economy with sociobiodiversity products.

*Includes seven initiatives that combine the planting of seedlings and seeds. **Includes 22 initiatives that apply densification and enrichment.

PATHS TO FOLLOW TO PROMOTE RESTORATION IN THE AMAZON

The Alliance for Restoration in the Amazon recommends expanding the scale of restoration in the Amazon by means of a positive agenda focused on compliance and improvement of legislation, the development of sustainable production chains and the engagement of all sectors – all of whom should commit to combat deforestation and promote the restoration of forest landscapes. For this purpose, we point out the following strategic paths:

1. PRIORITIZATION OF THE IMPLEMENTATION OF INTERNATIONAL COMMITMENTS AND NATIONAL POLICIES

The Paris Agreement is one of the main international agreements to which Brazil is a signatory, and its implementation is fundamental to attract foreign investments and strengthen Brazil's image as a country that can combine forest conservation and economic development. There are 12 million hectares to be recovered to meet the goals of this agreement translated into public policies, in particular the National Policy for the Recovery of Native Vegetation - PROVEG (Decree No. 8,972 of 23 January 2017). Its implementation can generate jobs, income and a series of economic, environmental and social benefits for Brazil. Through the implementation of PROVEG[XXI] and its laws, Brazil should prove its commitment to the climate issue and the conservation and restoration of forests. **Thus, it is recommended: (i) to create a periodic monitoring and evaluation process of the implementation of PROVEG; (ii) to implement Planaveg to manage the achievement of the goal of 12 million hectares; (iii) to establish a monitoring and transparency platform for the progress of the restoration goals [XXII]; and (iv) to reestablish the participation of civil society in Conaveg.**

2. IMPLEMENTATION OF THE ENVIRONMENTAL REGULARIZATION PROGRAMS (PRAS) OF THE STATES

The Law on the Protection of Native Vegetation establishes the process of environmental regularization of rural properties, based on the Rural Environmental Registry (CAR) and the Environmental Regularization Programs (PRAs). The PRA is one of the most important instruments of this law, as they will allow rural producers to have legal certainty to repair the environmental liabilities of their properties, and thus access economic and financial incentives. The states have a responsibility to implement their PRAs by establishing guidelines for the environmental regularization of rural properties based on the rules established by federal legislation. The PRAs also can, and should, regulate how it will be verified whether the recovery of native vegetation has been achieved, with minimum parameters for different restoration techniques, whether for the LR, the PPAs or other areas. It is essential that all states in the Amazon complete the process of preparing their PRAs and accelerate their implementation in the field. [XXIII] To this end, it is necessary to advance the validation of the CAR. **Thus, it is recommended: (i) to promote integrated engagement processes with the states to foster adherence to PRAs, including the creation and dissemination, through the National Rural Environmental Registry System (SICAR), of productive restoration models and options of financing lines to support the implementation of PRAs; (ii) to define indicators and parameters to monitor the restoration; (iii) to integrate the monitoring of the execution of PRAs with other territorial management systems; and, (iv) to promote the verification and rectification of the CAR.**

3. REGULATION OF THE USE AND MANAGEMENT OF AREAS UNDERGOING NATURAL REGENERATION

Areas under regeneration (secondary forests) can contribute to the recovery of biodiversity and carbon stocks, with lower financial costs than other methods. However, the adoption of this strategy requires mechanisms that encourage and guide its use and management. The states of the Amazon, with the exception of Pará [XXIV], lack specific regulations for the conservation of secondary vegetation - which results in high rates of deforestation. The creation of legal instruments for the protection and regulation of sustainable use, which respects the way of life of traditional populations, can guarantee the permanence of these forests in the long term. An area undergoing natural regeneration can only be considered as restoration area if there is intentionality, which must be proven through a legal framework, effective protection and monitoring. Abandoned or fallow areas, with no guarantee of permanence, should not be included in the accounting for areas under restoration. **Thus, it is recommended that the states create mechanisms and legal instructions to encourage and regulate the maintenance of secondary forests intended for restoration and the use and management of these forests within productive arrangements.**

4. IMPROVEMENT OF THE OPERATIONALIZATION OF LINES OF CREDIT

It is important to improve existing lines of credit, to create new lines and to facilitate access to them by producers (especially small family farmers). The Environmental and Forestry lines of the ABC Program, the Environment line of the BNDES (Brazilian Development Bank) and the notices of the BNDES for Ecological Restoration, the calls within the scope of the Amazon Fund, the National Program to support the Medium Rural Producer (PRONAMP) and the National Program for the Strengthening Family Farming in Forests (PRONAF Floresta), Eco and more recently Pronaf Bioeconomy are some examples of available lines of credit to promote forest landscape restoration in the Amazon. However, the low rate of taking loans on these lines indicates that adjustments are required. In addition to the uncertainties related to the political and economic scenario and the high level of indebtedness of rural producers to finance their main activity, a greater commitment to the operationalization of the existing lines of credits is necessary, since they are part of a strategy to implement public policies. The release of resources must prioritize the financial flow for forest restoration initiatives, as well as adjust their requirements to the reality of family farming in the Amazon. **Thus, it is recommended: (i) to improve the criteria for access to existing lines and to generate easier criteria for access to lines that promote restoration; (ii) to stimulate the engagement and training of the local management to offer the appropriate lines and release resources quickly to rural producers; and (iii) to create a financial monitoring system for lines of credit jointly with the financial agents aimed at restoration.**

5. STRENGTHENING OF SUSTAINABLE PRODUCTION CHAINS AND THE BIOECONOMY

Productive activities related to restoration (collection and management of seeds, production of seedlings, etc.) are part of the bioeconomy. Biotechnology based on biodiversity and the valorization of traditional knowledge must gain industrial scale and, thus, reduce pressure to change land use and increase the economic viability of sustainable production systems such as AFS. The forest bioeconomy is a great opportunity for economic development in the region, associated with conservation and restoration, with inclusion and social equity between peoples and genders. This process should guarantee the role of local communities and the fair sharing of benefits through efficient safeguards. The use of species that promote food sovereignty and security and the obtaining of timber and non-timber products is very important, both to make restoration possible and to generate long-term benefits. Knowledge and market development for restored forest products and services, at fair and competitive prices, is a key part of promoting the bioeconomy in the Amazon - together with the valorization of forestry activities, the valuation of forest goods and products, and the prospecting for new markets. Moreover, it is necessary to create lines of credit to promote the

bioeconomy and to rethink the taxation of sustainable productive chains so that they have more competitive power on the market. Taxes on native seeds, for example, represent a clear burden in the wrong place, creating obstacles to the economic and ecological success of restoration. **Tax exemptions and subsidies can leverage the restoration and bioeconomy chain in the Amazon. In addition, it is recommended: (i) to create a training and acceleration program for new business related to restoration; (ii) to guarantee technical assistance and rural extension; and (iii) to include the topic of restoration in the Brazilian Government's innovation programs, such as Inova Brasil.**

6. CREATION AND PROMOTION OF INITIATIVES FOR PAYMENT FOR ENVIRONMENTAL SERVICES (PES)

Payment for environmental services (PES) is an economic instrument for the conservation and restoration of forests provided for in the Law on the Protection of Native Vegetation. The Federal Government instituted the national PES program, Floresta + (Forest +) by Ordinance No. 288 of 2 July 2020. Some state in the Amazon (AC, AM, AP, MT, PA and RO) already have state legislation aimed at climate governance providing for PES programs. One of the main challenges is the economic valuation of environmental services. Another one is to identify permanent paying sources to give continuity to the fair monetization of these services. It is necessary to design and implement simplified and adequate financial mechanisms to reduce transaction costs and enable large-scale PES initiatives. Once the area, scope, goals, objectives values, in short, "the rules of the game" have been established, other measures are essential. Mechanisms that guarantee participation to the different stakeholders involved, action transparency, partnerships, arguments and decisions based on scientific data, the establishment of performance indicators and ways of measuring evolution, the definition of priorities for carrying out activities, the communication and customization of the program according to the demands of the local reality, are all required. **Thus, it is recommended: (i) to approve and prioritize the implementation of the National Policy for Payment for Environmental Services at Congress*; (ii) to create national carbon pricing and compensation systems and other environmental services; (iii) to promote municipal programs for the payment for state services (such as Reflorestar in the state of ES) and municipal PES programs (such as the Conservador da Mantiqueira in Extrema/MG); and (iv) to operationalize bilateral agreements and public-private partnerships to offset carbon emissions, ensuring a flow of national and international resources to promote conservation and restoration in Brazil.**

7. PRIORITIZATION OF AREAS FOR RESTORATION

Mapping geographic priorities for restoration is essential to ensure economies of scale, maximize the benefits of restoration (ecological, social and economic) and guide decision makers, donors and other stakeholders. Since 2016, the Ministry of the Environment in partnership with the Biodiversity Research Program (PPBio/MCTIC), the International Institute for Sustainability (IIS) and other partners have been working on the official map of priority areas for restoration in the Amazon. Other prioritization maps were published during this period. [xxv] However, it is not enough to define priorities at the regional level, because in the long run, it is the socio-economic complexities which operate at the local scale that determine governance and the successful implementation of restoration. Thus, priority maps should be used as a tool to support the discussion between different sectors of society on the decision on where to implement restoration. It is essential to internalize this discussion in states and municipalities to ensure that the restoration of forest landscapes is actually an effective tool to combat inequalities and improve people's quality of life. The MCTI Regenera Brasil Initiative was instituted by Ordinance No. 3,206 of 25 August 2020, one of its goals being the prioritization of areas. **We recommend that this mapping and prioritization process be participatory and include representatives from all spheres of government (national, state and municipal) and specialists from different sectors, including civil society organizations.**

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* On January 13, 2021, the Republic Presidency signed the Law No. 14,119, which institutes the National Policy for Payment for Environmental Services. However, important stretches were forbidden according to a <u>note</u> from the Brazilian Coalition on Climate, Forests and Agriculture.

8. INVESTMENTS IN EDUCATION, RESEARCH, DEVELOPMENT, INNOVATION AND EXTENSION

Educational, research and extension institutions are essential to qualify and expand the scale of restoration in the Amazon. The training of people to lead research, work, public policies and disseminate knowledge through technical assistance and rural extension is the link that makes viable restoration and the generation of knowledge required for the development of sustainable production chains. There are still many information gaps, such as structural, diversity and functional indicators related to restoration, the dynamics of natural regeneration and restoration methods in the region, among others. Knowledge about native species for use in tropical forestry and in AFS is also essential in the context of landscape restoration and the generation of economic benefits. Research in restoration can generate savings in the implementation of projects and create potential environmental, economic and social benefits. The scaling up of restoration also depends on the knowledge reaching those people who need or want to carry out this process. Technical assistance and rural extension play an essential role in the sharing of technical knowledge and the strengthening of efforts. **It is recommended that governmental, non-governmental and private initiative resources be allocated to promote human capital formation, research, technical assistance and rural extension to scale up and increase the viability of forest restoration in the Amazon. Lines of support for studies and research can be aligned with the central theme of forest landscape restoration in the context of the UN Decade on Ecosystem Restoration.**

9. INCREASE OF THE PARTICIPATION OF WOMEN, INDIGENOUS PEOPLES AND TRADITIONAL POPULATIONS IN RESTORATION

Studies prove the positive relationship between the diversity of views and the environmental issue. In restoration projects, the importance of a cross-sectional approach to the topics of gender and inclusion in all project axes is becoming increasingly clear. This includes the existence of inclusive policies/statements that promote gender equity in hiring and advocate non-discriminatory practices and the existence of mechanisms to report abusive or discriminatory practices. Promoting greater space for action and voice for women, indigenous communities and peoples and traditional populations provides gains for nature conservation. The participation of women has resulted in qualitative gains in restoration, as in the case of women working in the Xingu seed networks and the forest warriors in the Amazon region of Maranhão. Giving more space to women means giving more opportunities to families and communities in the rural environment. Promoting the participation of indigenous peoples and traditional populations in restoration must take into account a culturally appropriate engagement and the application of free, prior and informed consent, and such safeguards as are applicable. **Thus, we recommend that people and organizations adopt an inclusive gender communication, promote empowerment, in addition to identifying and overcoming possible barriers to the presence of women in decision-making and providing opportunities for the engagement of indigenous peoples, traditional populations and small producers.**

10. PROMOTION OF NETWORKS AND SPACES FOR DIALOG BETWEEN SECTORS

To catalyze and amplify the restoration agenda in the Amazon, the strengthening of networks at different levels is a key process, reconciling interests and integrating actions in favor of expanding the scale and efficiency of forest restoration. Some of the means for this are the generation, systematization and dissemination of new knowledge and information on the restoration of forest landscapes. Making available protocols and tools that allow data integration to monitor restoration actions and assess forest dynamics are important in this context. These actions can contribute to the formulation and implementation of public policies and to the economic instruments benefiting restoration. The development of social awareness and sensitization actions on the need for forest conservation and restoration in the Amazon stimulates the links in the productive chain and generates business, work and income opportunities. To this end, spaces for dialogue and the joint construction of solutions must be strengthened, as proposed by the **Alliance for Restoration in the Amazon**.

TECHNICAL NOTES

[I] This publication was prepared by the Technical Work Group (WG) of the Alliance for Restoration in the Amazon. Several people participated in the creation of this document: Danielle Celentano and Miguel Moraes (CI-Brasil), Joice Ferreira (Embrapa), Andreia Pinto and Alexandre Cunha (Imazon), Marlúcia Martins (MPEG), Beto Mesquita and Luiza Montoya (BVRio), Rodrigo Freire and Thais Ferreira Maier (TNC), Fernanda Rodrigues (Rede Mulher Florestal), Catarina Jakovac (Wageningen University), Sâmia Nunes, Lívia Rangel (Federal Rural University of the Amazon - UFRA), Eduardo Malta (ISA), Marcelo Ferronato (Ecoporé), Diego Brandão (Amazônia Socioambiental), Dimitrio Schievenin (Fundação Black Jaguar) and Thiago Belote (WWF Brasil). The document was submitted for review by all members of the Alliance. The following people participated in the review process: Milton Kanashiro (Embrapa), Alberto Akama (MPEG), Bruno Coutinho, Neila Maria Cavalcante da Silva and André Nahur (CI-Brasil), Rodrigo Junqueira (ISA) and Miguel Calmon (WRI Brasil). We thank farmers, researchers, several public, private and civil society institutions that provided data on their restoration initiatives for the creation of the map of initiatives.

[II] UN website for the decade on restoration: https://www.decadeonrestoration.org/

[III] UNEP (2019): https://www.resourcepanel.org/reports/land-restoration-achieving-sustainable-development-goals

[IV] As advocated by the One Health approach: Marselle M.R. et al. (2019) https://doi.org/10.1007/978-3-030-02318-8 , Zinsstag, J. et al (2011) https://doi.org/10.1016/j.prevetmed.2010.07.003. Everard, M. et al. (2020): https://doi.org/10.1016/j.envsci.2020.05.017

[V] Matricardi, E.A.T. et al. (2020): https://doi.org/10.1126/science.abb3021

[VI] Inpe (2020). http://www.obt.inpe.br/OBT/assuntos/programas/amazonia/prodes

[VII] Lovejoy, T.E. & C. Nobre (2018): https://doi.org/10.1126/sciadv.aat2340

[VIII] Aragão, L. (2012): https://doi.org/10.1038/nature11485

[IX] http://coalizaobr.com.br/boletins/pdf/Acoes_para_a_queda_rapida_do_desmatamento-CoalizaoBrasil.pdf

[X] Plan for the Prevention and Control of Deforestation in the Amazon

[XI] Rajão, R. et al (2020): https://science.sciencemag.org/content/369/6501/246/tab-article-info

[XII] TerraClass (Inpe): http://www.inpe.br/cra/projetos_pesquisas/dados_terraclass.php

[XIII] According to Soares-Filho et al. (2014), the forest liabilities in the Amazon Biome are estimated at 899,000 hectares of PPAs and 7.2 million hectares of LR, but 56% of the RL liabilities do not need to be restored and can be compensated through mechanisms such as the Environmental Reserve Quota (Law No. 12,651/2012). Soares-Filho, B. et al (2014): https://doi.org/10.1126/science.1246663

[XIV] Brazil has committed to zero illegal deforestation and to restore 12 million hectares by 2030 through the Paris Agreement signed during COP 21 in 2015, ratified by the National Congress in 2016 and promulgated in 2017 (Decree 9,073). The NDC is the measurement and communication instrument vis-à-vis the UNFCCC.

[XV] Silva Junior, C. et al (2020): https://doi.org/10.1038/s41597-020-00600-4

[XVI] Nunes, S. et al (2020): https://doi.org/10.1088/1748-9326/ab76db e

[XVII] Campos-Filho, E.M. et al (2013): https://doi.org/10.1080/10549811.2013.817341

[XVIII] Other techniques include transposition of fallen brushwood, seed banks and litterfall, in addition to natural and artificial bird perches.

[XIX] Maezumi. S.Y. et al (2018): https://doi.org/10.1038/s41477-018-0205-y

[XX] Methodology: The survey of forest restoration initiatives was carried out by means of the collection of primary data (application of questionnaires with institutions working on the topic) and secondary data (review of the specialized literature). Data collection was carried out initially in 2017 (Diego Brandão, 2017), through a consultancy contracted for this purpose. And in 2020, the database was updated and extended with the support from members of the Alliance. We thank Denis C. da Cruz for making available the database of his research (https://doi.org/10.1007/s11056-020-09777-3)

Limitations: These data are an underestimation, as this research does not capture the totality of areas under restoration, especially those individual initiatives undertaken by farmers to which we do not have access, nor does it capture the universe of agroforestry homegardens - a type of AFS well present throughout the region. This information will be known and public when the Law on the Protection of Native Vegetation and its mechanisms for environmental regularization are implemented.

[XXI] The main instrument for implementing PROVEG is the National Plan for the Recovery of Native Vegetation - Planaveg (Interministerial Ordinance No. 230 of 14 November 2017), together with the National Commission for the Recovery of Native Vegetation (Conaveg).

[XXII] The Brazilian Coalition on Climate, Forests and Agriculture is developing a national platform for monitoring restoration and reforestation in Brazil (http://www.coalizaobr.com.br/planodeacao/#item2)

[XXIII] The monitoring of PRAs in the states can be done via the Forest Code Monitoring Portal (www.portaldocodigo.org) and the effectiveness of the implementation of PRAs and the Law on the Protection of Native Vegetation can be monitored by the Forest Code Thermometer application.

[XXIV] The state of Pará has defined mechanisms and legal instruments for the management of secondary vegetation (IN 08 of 28 October 2015) which establishes that secondary forests over 20 years old cannot be deforested, and that deforestation of forests between 5 and 20 years old only may take place if the vegetation structure is below certain limits (https://www.semas.pa.gov.br/2015/11/03/instrucao-normativa-no-08-de-28-de-outubro-de-2015/).

[XXV] Brancalion, P. et al (2019): https://doi.org/10.1126/sciadv.aav3223. Strassburg, B.B.N. et al (2020): https://doi.org/10.1038/s41586-020-2784-9

The **Alliance for the Restoration in the Amazon** is an interinstitutional and multisectoral partnership established in 2017 with the main goal of promoting, qualifying and expanding the scale of forest landscape restoration in the Amazon. It currently consists of 80 member institutions (10 governmental, 13 academic and research institutions, 21 companies and 36 from civil society, including associations).

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