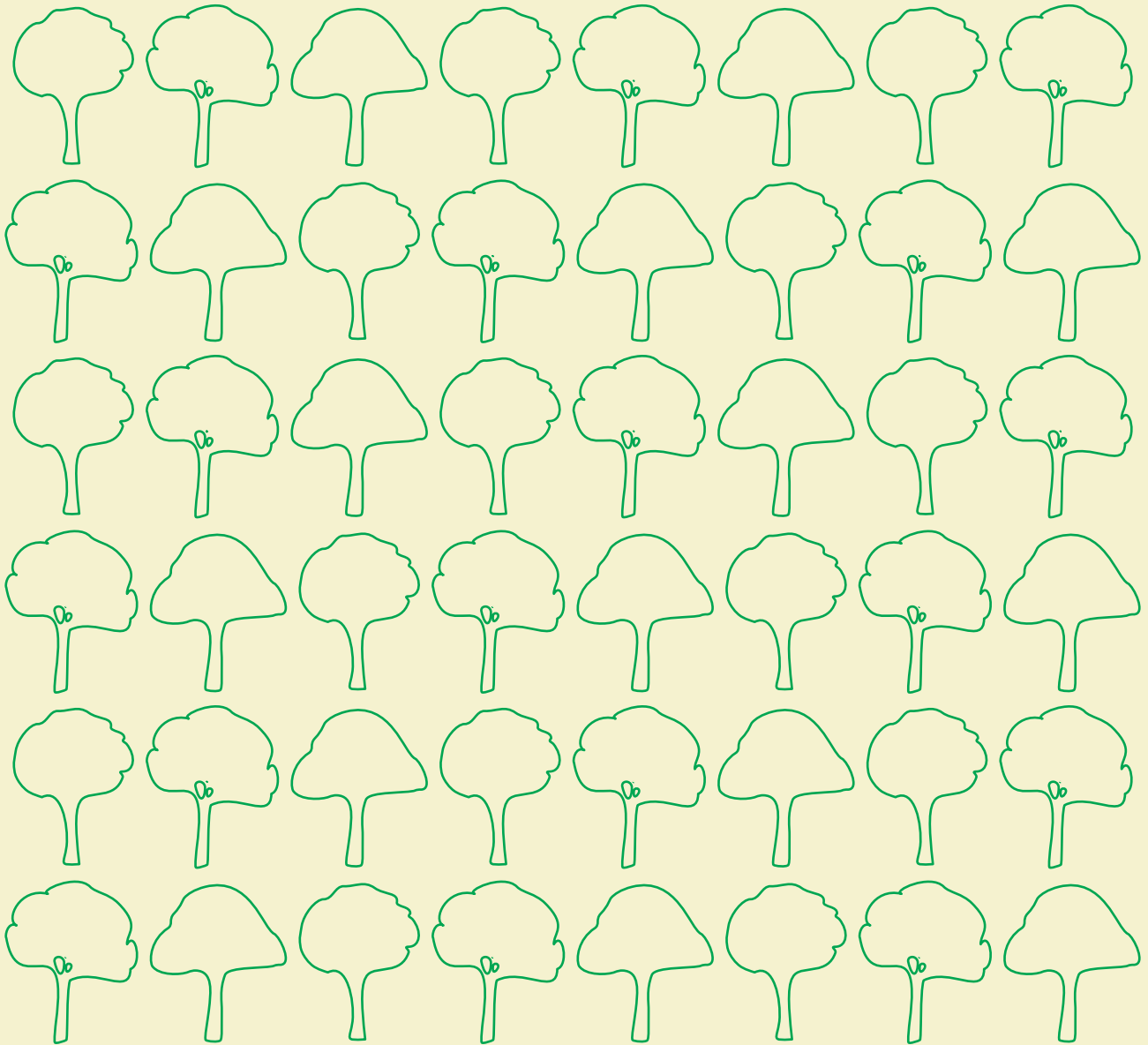




**BRAZILIAN
COALITION**

ON CLIMATE, FORESTS
AND AGRICULTURE



**RESEARCH AND
DEVELOPMENT PROGRAM
IN SILVICULTURE OF
NATIVE SPECIES**



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PREFACE

Since 2016, the Brazilian Coalition on Climate, Forests and Agriculture prioritized the establishment of a Research and Development (R&D) Program in Silviculture of Native Species. It is a pioneering initiative with the participation of universities, research institutions, private sector, governments, and civil society organizations to help Brazil develop a new forest economy with native species, unparalleled in the world.

Brazil is rich in forest resources, both natural and planted. But it has ceased to benefit from the opportunity to meet a significant portion of the global demand for tropical timber that the establishment of a sustainable and thriving native timber industry could provide. Meanwhile, sees growing deforestation and degraded pasture lands, that instead, could be benefited from silviculture of native species.

Developing silviculture with native species not only has the potential to reduce deforestation and forest degradation, but protect biodiversity, sequester carbon, generate jobs and income, and attract investment. As the world goes through a climate crisis and the Covid-19 pandemic, this is an opportunity to contribute to a low-carbon economic recovery. But to accomplish this potential, the country needs to expand knowledge about the economic benefits of planting native tree species.

The R&D Program presented in this report aims to promote scientific and technological development for silviculture of native species to gain scale in Brazil, similar to what happened with other commodities and industries. The Brazilian Coalition on Climate, Forests and Agriculture invites partners and funders to know the Program and join efforts. We hope that this will mark a turning point in a path that positions Brazil as a global leader in the sustainable production of tropical timber.




1. INTRODUCTION

Brazil has more than 500 million hectares (Mha) of native forests and approximately 8 Mha of planted forests with exotic species. However, the country still has high rates of deforestation, forest degradation, and unsustainable land use, which result in approximately 50 Mha of degraded pastures with low suitability for agriculture. This corresponds to about half of the area needed to meet the growing global demand for timber by 2050. However, despite this competitive advantage, tropical timber production in Brazil today accounts for less than 10% of global production, and most of it comes from our natural forests.

Silviculture of native species and their sustainable management can bring significant financial returns to landowners and investors and economic development for Brazil, as well as contribute to mitigation and adaptation to climate change. Brazil has pledged to restore and reforest 12 Mha of forest land and degraded areas by 2030 as part of its Nationally Determined Contribution (NDC) target. The Paris Agreement, the 20x20 Initiative, the Bonn Challenge and the UN Decade of Ecosystem Restoration recognize restoration and reforestation as a key strategy to mitigate climate change and improve economic and social resilience. In addition, Natural Climate Solutions (NCS), such as restoration and reforestation, are among the most effective global climate responses for the upcoming decades.

This combination of enabling factors can make silviculture of native species reach geographic and socioeconomic dimensions comparable to the consolidated agro-industrial sectors in Brazil, such as soy, corn, and sugar cane. In this context, the Research and Development Program in Silviculture of Native Species (R&DP-SNS) emerged.



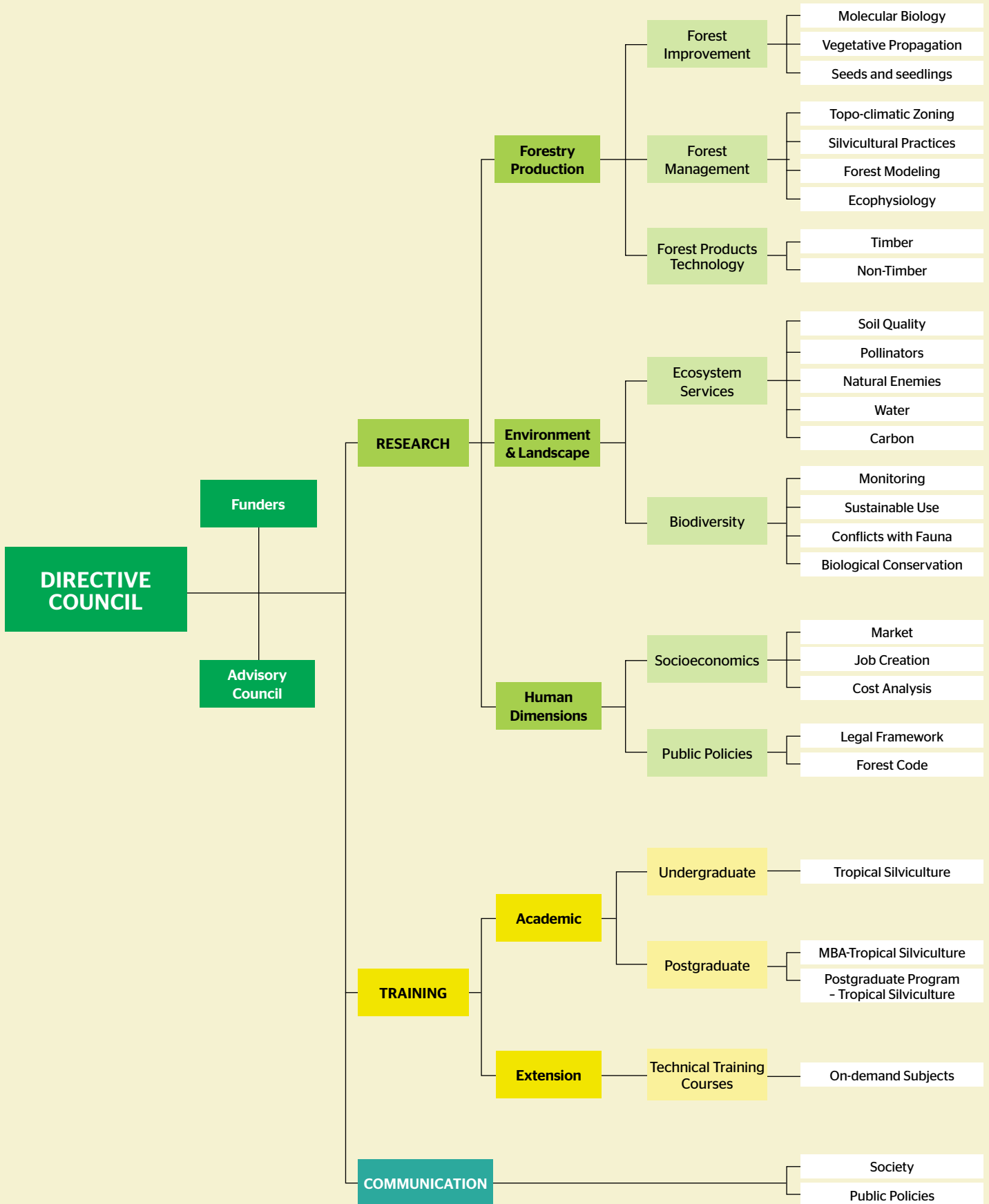
The Program has an interdisciplinary structure due to the complexity of its components and their respective interactions, and has three pillars: research, training, and communication, as shown in Image 1. The projects of R&DP-SNS are built under three priority areas: Forestry Production, Environment and Landscape, and Human Dimensions. The Forest Production area has three lines of research: Forest Improvement, Forest Management and Technology of Forest Products. Under Forest Improvement, three themes were prioritized: molecular biology, vegetative propagation, and seeds/seedlings. Under Forest Management, there are four priority themes: ecophysiology, forest modeling, silvicultural practices and topoclimatic zoning. Under Technology of Forest Products, there are two priorities: timber and non-timber products. The Environment and Landscape area has two lines of research: ecosystem services and biodiversity. Under ecosystem services, five themes are considered priorities: carbon, water, natural enemies, pollinators, and soil quality. Under biodiversity, four priorities were identified: biological conservation, conflicts with fauna, sustainable use, and monitoring. The Human Dimensions area is divided into two lines of research: socioeconomics and public policies. Under socioeconomics, three themes were prioritized: cost analysis, job creation and the market. Under public policies, two themes were prioritized: Forest Code and legal framework.

The conceptual basis of this Program can be found in *Research Gaps and Priorities in Silviculture of Native Species in Brazil*¹ and on the R&D Program blog². The first presents the results of the study conducted by a group of experts in the areas of research and development in silviculture of native species. The second presents the Program and its technological and socioeconomic dimensions.

1 Available at: https://wribrasil.org.br/sites/default/files/AF_WRI_WorkingPaper_ResearchGapsInSilviculture_digital_O.pdf

2 Available at: <https://wribrasil.org.br/pt/blog/o-potencial-inexplorado-da-silvicultura-com-nativas-no-brasil-e-importancia-de-pesquisa>

Image 1. Organogram of the Research and Development Program in Silviculture of Native Species (R&DP-SNS).





2. OBJECTIVES

The R&DP-SNS aims to promote the technological development necessary for the establishment of silviculture of native species in Brazil at a scale comparable to the main agro-industrial sectors in the country. The Program has the following specific objectives:

- subsidize cutting-edge technological development related to forest production areas; environment and landscape, and human dimensions;
- encourage development of an interdisciplinary culture to support sustainable production and consumption of products and services from silviculture of native species; and
- contribute to the implementation of multifunctional silvicultural landscapes that combine biological production and conservation.



3. PRIORITY ACTIONS FOR THE IMPLEMENTATION OF THE R&D PROGRAM

The priority actions for the implementation of the R&D program are:

- a. implementation of a Long-Term Research Sites Network (LTRS Network);
- b. structuring of the R&DP-SNS database; and
- c. minimum standardization of the sample design of R&DP-SNS experiments.

The detailing of both the database and the sampling design of long-term experiments of R&DP-SNS/LTRS will be defined in specific working meetings with the site research teams and their coordinators. Staff training is also an essential part of the Program.

3.1 Deployment of the Long-Term Research Sites Network (LTRS Network)

R&DP-SNS is structured as a network of long-term research sites, distributed in the Amazon and Atlantic Forest biomes. For this purpose, potential research institutions and sites with adequate infrastructure for the management of long-term research projects, located in these biomes, were mapped (Table 1). Initially the goal is to establish 20 long-term research sites of 15 hectares each. The species previously identified in the gaps and priorities study will be the focus of the research program (Table 2).

The network structure has a relatively high cost of implementation and maintenance and should include long-term studies related to Forest Production, Environment and Landscape, and Human Dimensions. Such sites may be owned by public institutions (for example, universities and research centers) or private (for example, companies linked to silviculture) institutions. For these reasons, funding agencies should provide funding support to infrastructure in both public and private institutions. Given the global relevance of Brazil in becoming a major player in silviculture of native tropical species, we see a role of national and international development banks in supporting the implementation of the R&DP-SNS.

Table 1. List of potential partner institutions of the Long-Term Research Sites Network of the Research and Development Program in Silviculture of Native Species (R&DP-SNS/LTRS Network).

Biome	Region	States	City	Institution
Atlantic Forest	South	PR	Colombo	Embrapa Forestry
			Telêmaco Borba	Klabin
		SC	Curitibanos	Federal University of Santa Catarina (UFSC)
	Southeast	SP	Botucatu	São Paulo State University (Unesp-Botucatu)
			Buri	Federal University of São Carlos (UFSCar)
			Itatinga	USP/ESALQ- Itatinga Experimental Station
			Manduri	São Paulo Forestry Institute (IF)
			Mogi-Guaçu	São Paulo Forestry Institute (IF)
			Santa Rita do Passa Quatro	São Paulo Forestry Institute (IF)
			Sorocaba	National Forest of Ipanema (FLONA Ipanema)
			Suzano	Suzano
		ES	Linhares	Vale Natural Reserve (RNV)
		MG	Rio Doce	Renova
			Lavras	Federal University of Lavras (UFLA)
			Viçosa	Federal University of Viçosa (UFV)
		RJ	Seropédica	UFRRJ and Embrapa Agrobiology
		North East	BA	Ilhéus e Porto Seguro
	Porto Seguro			Symbiosis
	Teixeira de Freitas			Suzano Arboretum Program
	Amazon	North	AM	Itacoatiara
MA			Açailândia	Suzano- Itabaiana Farm
MT			Cotriguaçu	ONF Brasil
			Sinop	Embrapa-Agrossilvipastoril
PA			Belterra	Embrapa-Amazônia Oriental
			Canaã dos Carajás	Vale
			Marabá	Vale
			Paragominas	Amata
			Redenção	Floresteca
Trombetas			MRN	

Table 2. List of native tree species selected for the R&DP-SNS in Brazil (15 from the Atlantic Forest and 15 from the Amazon rainforest biomes).

	SCIENTIFIC NAME	COMMON NAME
Atlantic Forest	<i>Araucaria angustifolia</i> (Bertol.) Kuntze	araucaria
	<i>Astronium graveolens</i> Jacq.	guaritá
	<i>Balfourodendron riedelianum</i> (Engl.) Engl.	pau-marfim
	<i>Calophyllum brasiliense</i> Cambess.	guanandi
	<i>Cariniana legalis</i> (Mart.) Kuntze	jequitibá-rosa
	<i>Cordia trichotoma</i> (Vell.) Arráb. ex Steud.	louro-pardo
	<i>Dalbergia nigra</i> (Vell.) Allemao ex Benth.	jacarandá-da-bahia
	<i>Genipa americana</i> L.	jenipapo
	<i>Hymenaea courbaril</i> L.	jatobá
	<i>Myracrodruon urundeuva</i> Allemao	aroeira-do-sertão
	<i>Peltophorum dubium</i> (Spreng.) Taub.	canafístula
	<i>Plathymenia reticulata</i> Benth.	vinhático
	<i>Handroanthus impetiginosus</i> (Mart. ex DC.) Mattos	ipê-roxo
	<i>Paubrasilia echinata</i> (Lam.) E. Gagnon, H.C. Lima & G.P. Lewis	pau-brasil
	<i>Zeyheria tuberculosa</i> (Vell.) Bureau ex Verl.	ipê-felpudo
Amazon Rainforest	<i>Bagassa guianensis</i> Aubl.	tatajuba
	<i>Bertholletia excelsa</i> Bonpl.	castanha-da-Amazônia
	<i>Carapa guianensis</i> Aubl.	andiroba
	<i>Copaifera multijuga</i> Hayne	copaíba
	<i>Cordia goeldiana</i> Huber	freijó-cinza
	<i>Dinizia excelsa</i> Ducke	angelim-vermelho
	<i>Dipteryx odorata</i> (Aubl.) Willd.	cumarú
	<i>Handroanthus serratifolius</i> (Vahl) S.Grose	ipê-amarelo
	<i>Jacaranda copaia</i> (Aubl.) D.Don	parapará
	<i>Schefflera morototoni</i> (Aubl.) Maguire et al.	morototó
	<i>Schizolobium parahyba</i> var. <i>amazonicum</i> (Huber ex Ducke) Barneby	paricá
	<i>Simarouba amara</i> Aubl.	marupá
	<i>Swietenia macrophylla</i> King	mogno
	<i>Virola surinamensis</i> (Rol. ex Rottb.) Warb.	ucuúba
	<i>Vochysia maxima</i> Ducke	quaruba-verdadeira



3.2 Structuring the Program's database

As general rule, the database of R&DP-SNS/LTRS should have open access to data and research results that have relied on public funding and restricted to patents that have relied on public-private financing, considering the requirements of the respective funding agencies. Open access to data may undergo a period of embargo, at the request of its collectors, in order to ensure its originality at the occasion of its scientific publication. This database should be structured as a gateway with open consultation but restricted to the inclusion of data by the members of the Program's research teams. In addition, data and metadata must be compatible and comparable across all LTRS Network.

3.3 Standardization of the sample design in experiments of the Program

A minimum standardization of sampling design in experiments of the R&DP-SNS with regional spatial-time scale is necessary. However, standardization may be flexible in experiments with a local spatial-time scale. In modeling studies, on the contrary, sample standardization may be flexible on a regional scale, but should be restricted on a local scale. In both cases, the relationship between the sample universe and the inferential universe of the experiments performed will be considered.



4. GOVERNANCE

The Program has an interdisciplinary structure, due to the complexity of its components and their respective interactions. Its governance must be done through a Directive Council (DC) supported by an Advisory Council (AC).

The DC shall be composed of seven members. The initial term of four of its members will be two years and the other three members will be three years, renewable for another two years. After the end of the initial terms, the terms of all members shall be two years. The AC will consist of up to ten members, with a three-year term and up to two renewals.

The coordinator of the DC and his/her alternate shall be elected by its members in direct election. It will be up to the coordinator to represent the DC and the R&DP-SNS before the legal authorities and to coordinate monthly, in-person or remote meetings, including the prior definition of their agenda items and the respective minutes.



5. FINANCING

The establishment of an R&D Program necessarily involves the strategic definition of its funding agencies. These have their own profiles and priorities with regard to target sectors (e.g., public and/or private), nature (e.g., infrastructure, equipment, personnel, etc.) and the dimension of the financing (broad or restricted). The best structuring of the R&DP-SNS should be based on a network of projects with different natures, specific objectives, and dimensions, and with different funding agencies. The R&DP-SNS should initially include three categories of funders, which are:

5.1. Development Banks

Due to the implementation costs of the LTRS Network infrastructure, the priority funders of this stage should be development banks and private sector. In both cases, initial contact with a senior representative of the institution is highly recommended. During this initial contact, the general idea of the R&DP-SNS and the magnitude of its cost to be financed by that institution should be presented. Based on the confirmation of support by the agent initially contacted and/or his/her team, a pre-proposal must be prepared and submitted unofficially to the institution. Only after the positive feedback, the complete proposal in the format requested by the institution should be prepared, reviewed by an ad hoc specialist previously contacted by the Directive Council (e.g., a possible future member of the Advisory Council of the R&DP-SNS) and then formally submitted.



5.2. Research Support Foundations (FAPs in the Portuguese acronym)

The FAPs may finance specific projects for both basic research and innovation (R&D), since the R&DP-SNS/LTRS network should have research sites in several states in the Amazon and Atlantic Forest biomes. In addition to the initial contact with the FAPs, a workshop should be held with specialists from the state and federal institutions in order to count on their effective participation, not only as future proponents, but as collaborators in the elaboration of a specific request for proposals (RfP) for R&D in silviculture of native species. This is the common practice with research funding agencies.

The next step should be the definition of the agency that will lead the consortium, usually the agency with the largest budget. It will be up to the agency to manage the RfP and its progress. To optimize the use of the RfP resources as a whole, the selection process must be conducted in each state by its respective FAP, and a final evaluation panel with the participation of representatives from all of them may be included.

5.3. Private Funders

A considerable part of the R&DP-SNS research budget may be obtained from the private sector, either through its foundations (e.g., Boticário Group Foundation, Natura Institute, among others) or through direct financing from interested companies, industries or sectors in environmental compensation and compliance, who are interested in planting native species for economic use. When feasible, this financing option tends to be more expeditious than the previous ones, applying almost exclusively to R&D. Its strategy also involves the initial contact with potential funding institution. In general, the selected projects deal with issues of direct interest to the industry and may have clauses of confidentiality.

6. RELATED RESEARCH AND MANAGEMENT PROGRAMS

In addition to funding agencies already mentioned to support R&D projects, several research and management programs have the potential to contribute directly or indirectly to the R&DP-SNS (Table 3). Among them, we highlight the National REDD+ (ENREDD+) and the Environmental Compensation. The first has a global dimension and focuses primarily on the role of forests in carbon sequestration and the consequent mitigation of climate change. The second has a local character and can be driven by the possible adaptation of Environmental Compensation through silviculture with native species. In this case, contact with the state secretary of agriculture is suggested. Entrepreneurs with environmental liabilities can enable the implementation of LTRS sites as part of their environmental compensation processes. The other programs developed by governments or institutions (e.g., Pensaf, CIFOR, FTP and ITTO) have, in principle, relatively limited potential, requiring specific contact through the network of research sites in which they are interested.

Table 3. Research and/or management programs potentially related to silviculture of native species.

Program	Topic
ENREDD+ (National REDD+)	National strategy to reduce emissions from deforestation and forest degradation, sustainable forest management and conservation and increase forest carbon stocks. (http://redd.mma.gov.br/en/the-national-redd-strategy)
Pensaf	National Silviculture Plan with Native Species and Agroforestry Systems (https://sbsafadm.wixsite.com/site/pensaf)
Cifor	Cifor (International Center for Forestry Research) promotes human well-being, equity, and environmental integrity by conducting innovative research, developing partner capacity and actively engaging in dialogue with all stakeholders to inform policies and practices that affect forests and people. Cifor is a CGIAR research center and leads the CGIAR Research Program in Forests, Trees and Agroforestry (FTA). (https://www.cifor.org/#)

Program	Topic
FTP	<p>The Forest-based Sector Technology Platform (FTP) is a European Technology Platform (ETP) dedicated to the forest-based sector. It is the meeting place for industry, forest owners and public authorities to discuss and build up a critical mass of knowledge on common research and innovation needs for the sector, and to decide on the best ways to cooperate. (https://www.forestplatform.org/)</p>
Environmental Compensation	<p>The Environmental Compensation is defined in Article 36 of Federal Law 9.985/2000 (National System of Conservation Units - SNUC), which determines that in cases of environmental licensing of undertakings with significant environmental impact, the entrepreneur is obliged to support the implementation and maintenance of the Conservation Unit of the Integral Protection Group, or, in the event that the project affects a specific Conservation Unit or its buffer zone, it must be one of the beneficiaries of the Environmental Compensation, even if it does not belong to the Integral Protection Group. (https://www.infraestruturameioambiente.sp.gov.br/compensacao-ambiental/)</p>
ITTO	<p>The International Tropical Timber Organization (ITTO) is an intergovernmental organization promoting the sustainable management and conservation of tropical forests and the expansion and diversification of international trade in tropical timber from sustainably managed and legally harvested forests.</p> <p>ITTO:</p> <ol style="list-style-type: none"> Develops internationally agreed policy guidelines and norms to encourage sustainable forest management (SFM) and sustainable tropical timber industries and trade; Assists tropical member countries to adapt such guidelines and norms to local circumstances and to implement them in the field through projects and other activities; Collects, analyzes and disseminates data on the production and trade of tropical timber; Promotes sustainable tropical timber supply chains; Helps develop capacity in tropical forestry. <p>https://www.itto.int/focus_areas/</p>



7. TRAINING

The capacity building should be carried out in two fronts: academic and extension. Both should be based on the scientific and technological structuring of the R&DP-SNS, which will involve the coordination of such programs at their institutions.

7.1 Academic

The Academic capacity building program includes two levels: undergraduate and postgraduate. At the undergraduate level, an elective course on tropical silviculture must be proposed in the courses of Forest Engineering at the institutions participating in the R&DP-SNS. At the postgraduate level, an interinstitutional postgraduate program in tropical silviculture should be created based on the participating institutions of the R&DP-SNS, together with the Interdisciplinary Committee of Coordination for the Improvement of Higher Education Personnel (Capes). In both cases, the potential participating institutions would be those that participated in the Workshop “*Research Gaps and Priorities in Silviculture of Native Species*”³. Undergraduate students (scientific initiation scholarships) and *stricto sensu* postgraduate students (academic master’s and doctoral degrees) should participate in this category.

7.2 Extension

The Extension capacity building program should include technical training courses at a secondary level and specialization (professional master’s and MBA) at public and private institutions that are part of the R&DP-SNS. Technical training courses may be taught in agricultural technical education schools through agreements to be coordinated by the R&DP-SNS, or directly by its participating institutions. Professional master’s and MBA courses may be prioritized by the institutions participating in the Workshop “*Research Gaps and Priorities in Silviculture of Native Species*”, with the direct or indirect participation of R&DP-SNS. Such courses may be paid for, which may provide funding support to the Program.

³ For a list of Workshop participants, see the document available at: https://wribrasil.org.br/sites/default/files/AF_WRI_WorkingPaper_ResearchGapsInSilviculture_digital_0.pdf



8. COMMUNICATION

Communication should initially prioritize the program image to public policy and sectors of society to which it relates, focusing on untying the connection between silviculture of native species and the illegal extraction of forest species in Brazil. The strategy for this should be based on online events (e.g., webinars) and presential (when possible), for the dissemination of the Program in the mainstream media and in its participation and connection with public policy (e.g., Planted Forests Chamber/MAPA). At this stage, the main objective will be to establish the Program's image as a technological and innovative initiative capable of consolidating silviculture of native species in Brazil as a process linked both to the development of *lato sensu* agriculture, or to what is conventionally called agribusiness, as to production and biological conservation, as interdependent processes and fundamental components of multifunctional agricultural and silvicultural landscape management.

EXPEDIENT

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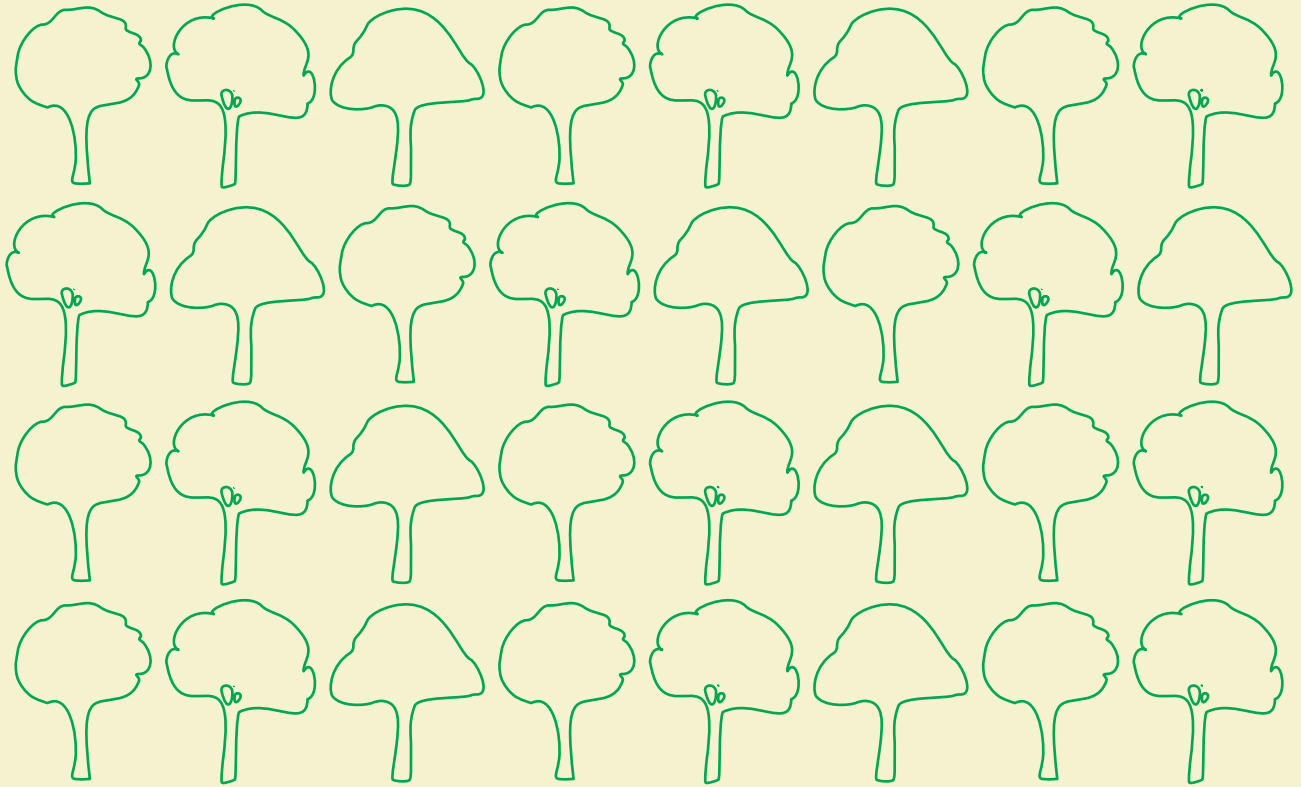
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